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Bibliography and index of literature on uranium and thorium and radioactive occurrences in the United States Part 5: Northeastern section

6 AND 7

By Margaret Cooper

U. S. GEOLOGICAL SURVEY
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Trace Elements Investigations Report 580

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Geology and Mineralogy

This document consists of 801 pages, including pp. 62 i, 162 i - 162 vii.
Series A

UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

BIBLIOGRAPHY AND INDEX OF LITERATURE ON URANIUM AND THORIUM AND RADIOACTIVE OCCURRENCES IN THE UNITED STATES. PARTS 5, 6, and 7: Connecticut, Delaware, Illinois, Indiana, Maine, Maryland, Massachusetts, Michigan, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, and Wisconsin.

By

Margaret Cooper

October 1956

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*This report concerns work done on behalf of the Division of Raw Materials of the U. S. Atomic Energy Commission.

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* Work on other projects interrupted the completion of this report after the author and gazetteer sections had already been prepared. In order to make the final report more useful and current, an additional set of author references, following rather than preceding the anonymous notes, was appended as pages 61 - 62 i and an alphabetical supplement to the gazetteer was appended as pages 162 i - 162 vii.

* * Index III has been omitted from this Trace Elements report because of its length but will be submitted in card form for inclusion in the published version.

FOREWORD

The following bibliography consists of references to published literature, press releases, speeches, and both open-file and other unclassified reports dealing with uranium, thorium, and radioactive occurrences in Connecticut, Delaware, Illinois, Indiana, Maine, Maryland, Massachusetts, Michigan, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, and Wisconsin. It represents Parts 5, 6, and 7 of a comprehensive bibliography planned to cover references to all similar deposits throughout the world. (This report will be divided into three parts for publication purposes. Part 5 will cover the Middle Atlantic states: Delaware, Maryland, New Jersey, New York, and Pennsylvania. Part 6 will cover the North Central states: Illinois, Indiana, Michigan, Ohio, and Wisconsin. Part 7 will cover the New England states: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont.) The object has been to make the present bibliography as all-inclusive as possible, from the point of view of including all the major papers and at least one reference to each known radioactive occurrence in these sixteen states, but only references for which the original text was readily available for examination and checking have been cited at this time. The remaining old and new references will be added to this basic list when the section is ready for inclusion in the comprehensive volumes, planned for future publication as a complete bibliography of the entire United States and world.

The main bibliography consists of an author section, in which each reference has been assigned an individual item number. Following the author listings are the anonymous notes, which are listed in chronological order and alphabetically by title within each year.* The bibliography proper is followed by three indexes: * Index 1, Gazetteer for Connecticut, Delaware, Illinois, Indiana, Maine, Maryland, Massachusetts, Michigan, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, and Wisconsin; * Index II, Geographical Index for Connecticut, Delaware, Illinois, Indiana, Maine, Maryland, Massachusetts, Michigan, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, and Wisconsin; **Index III, Subject Index for Connecticut, Delaware, Illinois, Indiana, Maine, Maryland, Massachusetts,

* Work on other projects interrupted the completion of this report after the author and gazetteer sections had already been prepared. In order to make the final report more useful and current, an additional set of author references, following rather than preceding the anonymous notes, was appended as pages 61-62 i and an alphabetical supplement to the gazetteer was appended as pages 162 i - 162 vii.

** Index III has been comitted from this Trace Elements report because of its length but will be submitted in card form for inclusion in the published version.

Michigan, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, and Wisconsin. The geographical and subject indexes have been made as detailed as practicable because the main reference entries have not been annotated. Where there are variations in spelling or alternate names for the same locality, a standard form has been used in the geographical and subject indexes and the variations have been noted in the gazetteer. Where county boundary lines have been changed since a reference was written, the locality has been listed under the county in which it is found today.

A fairly extensive survey has been made of the geological and mining literature published through 1949 in compiling the references included in this bibliography. A few of the standard American and English geological and mining publications have also been reviewed through 1955. Every reference cited in the bibliography has been checked with the original text. References re-cited from the first four sections of the bibliography, * Part 1 (RMO-928) covering Arizona, Nevada, and New Mexico, Part 2 (RMO-1036) covering California, Idaho, Montana, Oregon, Washington, and Wyoming, Part 3 (RME-4003) covering Colorado and Utah, and Part 4 (RME-4013) covering Arkansas, Iowa, Kansas, Louisiana, Minnesota, Missouri, Nebraska, North Dakota, Oklahoma, South Dakota, and Texas, have been assigned the same item number as in Parts 1, 2, 3, and 4. The authors and item numbers of these re-cited references have also been recorded here in regular alphabetical order in the second group of author listings, which gives all the new references on the states covered by the bibliography.

Parts 1 - 4 of this bibliography were prepared by the Division of Raw Materials of the U. S. Atomic Energy Commission. This report covering parts 5, 6, and 7 has been prepared by the U. S. Geological Survey on behalf of the Division of Raw Materials of the U. S. Atomic Energy Commission.

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GAZETTEER FOR CONNECTICUT, DELAWARE, ILLINOIS, INDIANA, MAINE, MARYLAND, MASSACHUSETTS, MICHIGAN, NEW HAMPSHIRE, NEW JERSEY, NEW YORK, OHIO, PENNSYLVANIA, RHODE ISLAND, VERMONT, AND WISCONSIN

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Bristol: See Rhode Island-Bristol Co., 896.

Broad Mountain: See Pennsylvania-Carbon Co., 733.

Broad Mountain anticline: See Pennsylvania-Carbon Co., 817.

Broad Street and Olney Avenue: See Philadelphia, Pennsylvania-Philadelphia Co., 665, 1018.

Broad Top quadrangle: See Pennsylvania-Bedford, Fulton, and Huntingdon Cos., 893.

Broadway: See New York City, New York-New York Co., 640, 693, 845.

Broken Arc Coal Co. strip mine: See Ohio-Jackson Co., 966.

Brookfield: See Connecticut-Fairfield Co., 968.

Brookfield coal bed: See Pennsylvania-General-995.

Brookline: See New Hampshire Hillsboro Co., 716.

"Brookline" granite: See New Hampshire-Hillsboro Co., 716.

Brooks quarry: See Glastonbury (township), Connecticut-Hartford Co., 716, 718.

Brookville: See Pennsylvania-Jefferson Co., 748.

Brookville coal: See Pennsylvania-Butler Co., 893; Centre and Jefferson Cos., 748.

Brookville No. 4 coal: See Ohio-Jackson, Lawrence, Mahoning Portage, and Tuscarawas Cos., 966.

Brookville quadrangle: See Pennsylvania-Clarion and Jefferson Cos.,748.

Brotherton mine: See Michigan-Gogebic Co., 745, 746.

Brown, George T., Coal Co. strip mine: See Pennsylvania-Indiana Co., 893.

Brown Coal Co. mine 5.5 mi. N of Clay City: See Indiana-Clay Co., 967.

Brown County Sanitarium well: See Wisconsin-Brown Co., 796.

Brown University campus: See Providence, Rhode Island-Providence Co., 896.

Brownfield: See Maine-Oxford Co., 877.

Brownsville: See Pennsylvania-Fayette Co., 893.

Brownsville: See Vermont-Windsor Co., 717.

Brownsville quadrangle: See Pennsylvania-Fayette Co., 893.

Brun drift mine: See Ohio-Muskingum Co., 966.

Brush Creek shale: See Pennsylvania-Beaver Co., 748.

Brush Valley: See Pennsylvania-Indiana Co., 893.

Bucar Coal Co. strip mine: See Pennsylvania-Allegheny Co., 893.

Buchanan: See Pennsylvania-Fayette Co., 893.

Buck Mountain: See New York-Essex Co., 843.

Buck Mountain coal: See Pennsylvania-Carbon Co., 994, 1011, Columbia Co., 1011, and Schuylkill Co., 994, 1011.

Buckfield: See Maine-Oxford Co., 690.

Buckingham: See Glastonbury (township), Connecticut-Hartford Co., 716, 718.

Buckland: See Massachusetts-Franklin Co., 738.

Buckwheat mine: See New Jersey-Sussex Co., 1043.

Buckwheat mine dump: See New Jersey-Sussex Co., 1041.

Buffalo Hill: See Vermont-Caledonia Co., 716.

Buffalo Hill quarry: See Hardwick, Vermont-Caledonia Co., 716, 717.

Bug Hole mine: See Michigan-Baraga Co., 840.

Bugbee, Alexander, & Packer prospect: See Newark, Vermont-Caledonia Co., 717.

Buhl B. Black Construction Co. strip mine: See Pennsylvania-Somerset Co., 893.

Bullock quarry: See Bedford, New York-Westchester Co., 846.

Bullock's quarry: See Pennsylvania-Delaware Co., 766.

Bumpus mine: See Albany, Maine-Oxford Co., 887.

Bunting's feldspar quarry: See Pennsylvania-Delaware Co., 766.

Bunyan Mountain: See Massachusetts-Hampden Co., 716.

Buresch quarry: See Bedford, New York-Westchester Co., 846.

Burgettstown quadrangle: See Pennsylvania-Washington Co., 893.

Burkhart Coal & Lumber Co., strip mine: See Pennsylvania-Blair Co., 893.

Burlington: See Vermont-Chittenden Co., 745, 1039.

Burning Star No. 1 drift and strip mines of Truax-Traer Coal Co.: See Illinois-Jackson Co., 894.

Burnt Mills: See Maryland-Montgomery Co., 888, 940.

Burtonsville: See Maryland-Prince Georges Co., 777.

Busche mine: See New Jersey-Morris Co., 843.

Bushkill Creek, Quarry along: See Easton, Pennsylvania-Northampton Co., 865.

Butcher Hollow: See Pennsylvania-Carbon Co., 817, 995.

Butler quadrangle: See Pennsylvania-Butler Co., 893.

Byram: See New Jersey-Hunterdon Co., 973.

Byram (township): See New Jersey-Sussex Co., 969.

Byram gneiss: See New Jersey-Sussex Co., 969.

Byram (?) gneiss: See Pennsylvania-Bucks Co., 843.

Byram Harbor: See Greenwich, Connecticut-Fairfield Co., 716, 718.

C

C or Middle Kittanning coal: See Pennsylvania-Clearfield Co., 748.

C' or Upper Kittanning coal: See Pennsylvania-Clearfield Co., 748.

C. A. Hughes Coal Co. strip mine: See Pennsylvania-Cambria Co., 893.

C. D. McQ. spring: See Morning Sun, Ohio-Preble Co., 903.

C. D. McQ. spring (Wood): See Morning Sun, Ohio-Preble Co., 903.

C. F. Keck's drift mine: See Pennsylvania-Westmoreland Co., 893.

C. McQ. spring: See Morning Sun, Ohio-Preble Co., 903.

C. McQ well: See Morning Sun, Ohio-Preble Co., 903.

C. W. spring: See Morning Sun, Ohio-Preble Co., 903.

Cabot: See Vermont-Washington Co., 716, 717.

Cadiz: See Ohio-Harrison Co., 966.

Cadiz quadrangle: See Ohio-Harrison Co., 966.

Cadiz Coal Co. strip mine: See Ohio-Harrison Co., 966.

Cadiz-Smithfield road: See Ohio-Harrison Co., 966.

Caley & Jennings drift mine: See Ohio-Coshocton Co., 966.

Califon: See New Jersey-Hunterdon Co., 973.

Calumet conglomerate: See Michigan-Houghton Co., 992.

Calumet and Hecla collection: See Michigan-Houghton Co., 992.

Calumet and Hecla mine: See Michigan-Houghton Co., 991.

Calumet and Hecla No. 12 shaft, Level 78: See Michigan-Houghton Co., 992.

Cambrian formation: See Pennsylvania-Philadelphia Co., 677.

Cambrian limestone: See New Jersey-Hunterdon Co., 994.

Cambrian sandstone: See Pennsylvania-Montgomery Co., 665.

Cambrian sandstone: See Wisconsin-Brown, Dane, Door, Marinette, Oconto, Outagamie and Shawano Cos., 796.

Cambrian slate: See New York-Washington Co., 875.

Cambridge: See Massachusetts-Suffolk Co., 686.

Cambridge: See Ohio-Guernsey Co., 966.

Cambridge quadrangle: See Ohio-Guernsey Co., 966.

Camp Phoenix: See Maine-Piscataquis Co., 877.

Camp Smith: See New York-Westchester Co., 842, 1005.

Canaan Center: See New Hampshire-Grafton Co., 697.

Canajoharie shale: See New York-Saratoga Co., 875.

Canal Road, Quarry at end of, on Schuylkill River: See Philadelphia, Pennsylvania-Philadelphia Co., 1018.

Canfield phosphate mine: See New-Jersey-Morris Co., 843.

Cannelsburg: See Indiana-Daviess Co., 967.

Cannelton: See Pennsylvania-Beaver Co., 748.

Cannelville: See Ohio-Muskingum Co., 966.

Cannon mine: See New Jersey-Passaic Co., 843.

Canonsburg: See Pennsylvania-Washington Co., 513.

Canton: See Maine-Oxford Co., 887.

Cape Ann: See Massachusetts-Essex Co., 672, 727, 745, 793, 800, 802, 803, 899, 1006.

Cape Ann granite: See Cape Ann, Massachusetts-Essex Co., 802, 1006.

Cape May: See New Jersey-Cape May Co., 844.

Cape May formation: See New Jersey-Cape May & Monmouth Cos., 844.

Carbon: See Indiana-Clay Co. but see also Indiana-Parke Co., 967.

Carbon Coal Co. strip mine, near Pisgah school: See Pennsylvania-Butler Co., 893.

Carbon Coal Co. strip mine, 1½ mi. W of Cherry Valley: See Pennsylvania-Butler Co., 893.

Carbondale: See Pennsylvania-Lackawanna Co., 1011.

Carbondale formation, coal beds: See Illinois-General, 894.

Carbondale quadrangle: See Illinois-Jackson Co., 894.

Carbondale quadrangle: See Pennsylvania-Lackawanna Co., 1011.

Carl Jenkins well: See Wisconsin-Brown Co., 796.

Carline quarry: See Glastonbury (township), Connecticut-Hartford Co., 718.

Carlton quarry: See Milford, New Hampshire-Hillsboro Co., 715, 716.

Carmel: See New York-Putnam Co., 842.

Carmel, Mount: See Pennsylvania-Northumberland Co., 994.

Carmen, Earl, drift mine: See Ohio-Lawrence Co., 966.

Carnegie quadrangle: See Pennsylvania-Allegheny Co., 893.

Carpenter mine: See Grafton, New Hampshire-Grafton Co., 690, 886.

Carpentersville mine: See New Jersey-Warren Co., 843.

Carrier Mills: See Illinois-Saline Co., 894.

Carroll quarry: See Milford, Massachusetts-Worcester Co., 715, 716.

Carter's Creek: See Pennsylvania-Washington Co., 893.

Cascade and Allis mine: See New Jersey-Sussex Co., 843.

Casco: See Maine-Cumberland Co., 877.

Casco Junction: See Wisconsin-Door Co., 796.

Caseyville conglomerate: See Illinois-Johnson Co., 928, 929.

Caseyville formation, coal beds: See Illinois-General, 894.

Castanea sandstone: See Pennsylvania-Huntingdon Co., 825, 826.

Catskill beds: See Jim Thorpe, Pennsylvania-Carbon Co., 867.

Catskill formation: See Pennsylvania-Carbon Co., 841, 995, 1005. See also Jim Thorpe, Pennsylvania-Carbon Co., 733, 817.

Catto quarry: See Westerly, Rhode Island-Washington Co., 715.

Catto Granite Co.: See Westerly, Rhode Island-Washington Co., 715.

Caucomgomoc Lake: Maine-Piscataquis Co. but see Maine-Somerset Co., 877.

Cave-in-Rock: See Illinois-Hardin Co., 796.

Cedar Swamp Pond: See Massachusetts-Worcester Co., 716.

Celina: See Ohio-Mercer Co., 903.

Centennial mine: See Michigan-Houghton Co., 746.

Centennial shaft: See Michigan-Houghton Co., 992.

Center iron sandstone: See Pennsylvania-Montour and Perry Cos., 935.

Center Groton: See Groton (township), Connecticut-New London Co., 716.

"Center Groton granite": See Groton (township), Connecticut-New London Co., 716, 718.

Center Pond: See Vermont-Caledonia Co., 717.

Center or Island Pond: See Vermont-Caledonia Co., 716.

Center Strafford: See New Hampshire-Strafford Co., 859, 958, 978.

Central New England Province: See Connecticut-New Haven and Windham Cos., 842. See also New England-General, 842. See also New Hampshire-Belknap, Carroll, Cheshire, Coos, Grafton, Hillsboro, Merrimack, and Strafford Cos., 842. See also Rhode Island-Providence and Washington Cos., 842. See also Vermont-Chittenden, Essex, Orange, and Windham Cos., 842.

Central Park: See New York City, New York-New York Co., 640.

Central Railroad of New Jersey: See Jim Thorpe, Pennsylvania-Carbon Co., 733, 817.

Centralia: See Pennsylvania-Columbia Co., 1011.

Chadd's Ford: See Pennsylvania-Chester Co., 1018.

Champion: See Michigan-Marquette Co., 1064.

Champion mine: See Michigan-Houghton Co., 829, 991, 992, 1066.

Champion mine No. 1 shaft: See Michigan-Houghton Co., 992.

Champion mine No. 4 shaft: See Michigan-Houghton Co., 992.

Champlain iron region: See New York-General, 705, 882. See also New York-Essex Co., 720.

Champlain Iron District: See New York-General, 1034.

Champlain, Lake: See New York-Essex Co., 843, 880.

Chandler Hill: See New Hampshire-Sullivan Co., 695.

Chandler Mountain: See White Mountains Alkaline Batholith, New Hampshire-Carroll Co., 673.

Chandler's Mills: See New Hampshire-Sullivan Co., 937.

Charlestown: See Rhode Island-Washington Co., 715, 716.

Chateaugay mine: See New York-Clinton Co., 843.

Chatham: See Connecticut-Middlesex Co., 916.

Chatham: See New York-Columbia Co., 875.

Chatham granite: See New Hampshire-Carroll and Coos Cos., 842.

Chatham group: See New Hampshire-General, 674.

Chattanooga shale: See Illinois-General and Ohio-General, 883. See also United States-General-405, 642.

Checkerberry Village: See Vermont-Chittenden Co., 842.

Cheever: See New York-Essex Co., 785.

Cheever mines: See New York-Essex Co., 843.

Chelmsford: See Massachusetts-Middlesex Co., 746, 800.

Chelmsford granite: See Massachusetts-Middlesex Co., 745, 746, 793.

Chelmsford granite-migmatite: See Massachusetts-Middlesex Co., 804.

Cheltenham (township): See Pennsylvania-Montgomery Co., 665, 766.

Cherry Ridge beds: See Jim Thorpe, Pennsylvania-Carbon Co., 817.

Cherry Ridge group: See Jim Thorpe, Pennsylvania-Carbon Co., 733.

Cherry Ridge member of Catskill formation: See Pennsylvania-Carbon Co., 841.

Cherry Valley: See Pennsylvania-Butler Co., 893.

Cherryfield: See Maine-Washington Co., 877.

Chester: See Connecticut-Middlesex Co., 934, 956, 960, 968.

Chester (township): Massachusetts-Hampden Co. but see Massachusetts-Berkshire-Hampden Cos., 715.

Chester (village): Massachusetts-Hampden Co. but see Massachusetts-Berkshire-Hampden Cos., 715.

Chester: See Pennsylvania-Delaware Co., 758, 762, 766, 770, 771, 907, 908, 1018.

Chester (township): See Pennsylvania-Delaware Co., 665, 766, 911.

Chester: See Vermont-Windsor Co., 855.

"Chester dark" granite: See Massachusetts-Berkshire-Hampden Cos., 715.

"Chester" dark and light granite: See Massachusetts-Berkshire Co., 716.

"Chester light" granite: See Massachusetts-Berkshire-Hampden Cos., 715.

Chester Creek: See Pennsylvania-Delaware Co., 665, 766, 771, 911.

Chester Creek Branch of B. & W. railroad: See Pennsylvania-Delaware Co., 1018.

Chester Springs: See Pennsylvania-Chester Co., 665, 766, 833, 975.

Chesterfield: See Massachusetts-Hampshire Co., 654, 662, 671, 738, 739, 797, 950, 952, 954, 957, 963, 979, 980, 981, 982.

Chesterfield Hollow: See Massachusetts-Hampshire Co., 738, 739, 797.

Chesterhill quadrangle: See Ohio-Athens Co., 966.

Chestnut Grove: See Pennsylvania-Clearfield Co., 748.

Chestnut Hill: See Pennsylvania-Northampton Co., 661, 865.

Chestnut Hill schists: See Pennsylvania-Montgomery Co., 911.

Chesuncook Lake: See Maine-Piscataquis Co., 877.

Cheves, William R. (quarry operator): See Rockport, Massachusetts-Essex Co., 715.

Cheves Green Granite quarry: See Rockport, Massachusetts-Essex Co., 715, 716.

Chicago and Northwestern RR. Depot well: See Wisconsin-Brown Co., 796.

Chicago-Wilmington and Farmington Coal Co., shaft mine: See Illinois-Jefferson Co., 894.

Chilson: See New York-Essex Co., 875.

Chimney Rock quarry: See New Jersey-Somerset Co., 786.

Chippewa felsite: See Michigan-Houghton Co., 991.

Chippewa Creek: See New York-St. Lawrence Co., 683.

Chocorua Group: See White Mountains Alkaline Batholith, New Hampshire-Carroll Co., 673.

Chrisney: See Indiana-Spencer Co., 967.

Chutz Brothers strip mine: See Pennsylvania-Butler Co., 893.

Cincinnati: See Ohio-Hamilton Co., 1057.

City Well (Bonduel): See Wisconsin-Shawano Co., 796.

City Well (Brillion): See Wisconsin-Calumet Co., 796.

City Well (Hortonville): See Wisconsin-Outagamie Co., 796.

City Well (Pulaski): See Wisconsin-Brown Co., 796.

City Well No. 2 (Algoma): See Wisconsin-Door Co., 796.

City Well No. 2 (Seymour): See Wisconsin-Outagamie Co., 796.

City Well No. 3 (Oconto Falls): See Wisconsin-Oconto Co., 796.

City Well No. 4 (Kaukauna): See Wisconsin-Outagamie Co., 796.

City Well No. 6 (Oconto): See Wisconsin-Oconto Co., 796.

Clairsville quadrangle: See Ohio-Belmont Co., 966.

Clairton: See Pennsylvania-Allegheny Co., 893.

Clarence Greatens well: See Wisconsin-Brown Co., 796.

Clarington quadrangle: See Ohio-Belmont Co., 966.

Clarion: See Pennsylvania-Clarion Co., 893.

Clarion coal: See Pennsylvania-Clearfield Co., 748. See also Pennsylvania-Huntingdon Co., 893.

Clarion quadrangle: See Pennsylvania-Clarion Co., 893.

Clarion River: See Pennsylvania-Clarion Co., 893.

Clarion, Upper and Lower, coal beds: See Pennsylvania-General, 995.

Clark coal: See Pennsylvania-Lackawanna Co., 1011.

Clark's Corners: See Connecticut-Windham Co., 842.

Clark's Ledge: See Clarke Ledge, Massachusetts-Hampshire Co., 797.

Clarke (or Clark's) Ledge: See Chesterfield, Massachusetts-Hampshire Co., 739, 797.

Clay City: See Indiana-Clay Co., 967.

Clay City quadrangle: See Indiana-Clay Co., 967.

Clayburg: See New York-Clinton Co., 875.

Clayville: See Rhode Island-Providence Co., 842.

Clear Creek formation: See Illinois-Hardin Co., 680.

Clear Spring: See Maryland-Washington Co., 935.

Clearfield quadrangle: See Pennsylvania-Clearfield Co., 748, 893.

Clearfield Creek: See Pennsylvania-Clearfield Co., 748.

Cleveland: See Ohio-Cuyahoga Co., 745.

Cleveland shale: See Ohio-General, 824.

Clifton mines: See New York-St. Lawrence Co., 843.

Clifton House: See Swampscott Beach, Massachusetts-Essex Co., 643.

Clinton: See Indiana-Vermillion Co., 967.

Clinton: See New Jersey-Hunterdon Co., 843, 994, 995, 1086.

Clinton: See New York-Oneida Co., 935.

Clinton formation: See New York-Cayuga, Monroe, Niagara, Oneida, and Wayne Cos., 935. See Pennsylvania-Huntingdon Co., 825, 826. See Pennsylvania-Union Co., 935.

Clinton group: See Maryland-Allegany Co., 935. See Pennsylvania-Juniata, Huntingdon, Lycoming, Monroe, Perry, Snyder, and Union Cos., 935.

Clinton group (Swatara iron sandstone?): See Pennsylvania-Lebanon Co., 935.

Clinton iron ore: See Pennsylvania-Huntingdon Co., 935.

Clinton Metallic Paint Company mine: See New York-Oneida Co., 935.

Clintonville: See Wisconsin-Waupaca Co., 796.

Close mine on Hughy Close farm: See New York-Essex Co., 843.

Clough, Mount: See New Hampshire-Grafton Co., 774.

Coal Bluff: See Pennsylvania-Fayette Co., 893.

Coal Bluff Mine of Siler Coal Co.: See Pennsylvania-Fayette Co., 893.

Coal City: See Indiana-Owen Co. but see also Indiana-Clay Co., 967.

Coal City quadrangle: See Indiana-Owen Co. but see also Indiana-Clay Co., 967.

Coal II: See Indiana-Daviess and Parke Cos., 967.

Coal III: See Indiana-Clay, Vermillion, and Vigo Cos., 967.

Coal IIIa: See Indiana-Clay Co., 967.

Coal IV: See Indiana-Greene and Pike Cos., 967.

Coal V: See Indiana-Greene, Pike, Vermillion, Vigo, and Warrick Cos., 967.

Coal V coal bed: See Indiana-Southwest part, 967.

Coal Va: See Indiana-Warrick Co., 967.

Coal VI: See Indiana-Greene, Knox, and Sullivan Cos., 967.

Coal VII: See Indiana-Gibson, Sullivan, Vermillion, and Warrick Cos., 967.

Coal VII coal bed: See Indiana-Southwest part, 967.

Coal Measures: See Pennsylvania-General, 1005.

Coal No. 6: See Illinois-General, 819.

Coastal Plain: See Delaware-General, 883. See also Maryland-General, 888, and Maryland-Southern Part, 731.

Cockeysville marble: See Maryland-Howard Co., 888.

Coesa Spring: See Saratoga Springs, New York-Saratoga Co., 625, 657, 869.

Cokesbury: See New Jersey-Hunterdon Co., 973.

Cokesbury mine: See New Jersey-Hunterdon Co., 843.

Cold spring: See Williamstown, Massachusetts-Berkshire Co., 959.

Coldbrook: See Pennsylvania-Fayette Co., 893.

Coldwater red rock: See Michigan-Osceola Co., 664.

Coldwater shale: See Michigan-Osceola Co., 664.

Coleman: See Wisconsin-Marinette Co., 796.

Colesville: See New Jersey-Sussex Co., 935.

Collin, John, well: See Wisconsin-Door Co., 796.

Collin Kemper estate: See New York-Westchester Co., 1029.

Collins Hill: See Portland, Connecticut-Middlesex Co., 753, 936, 941, 1028.

Collins Hill (or Strickland) quarry: See Portland, Connecticut-Middlesex Co., 78, 82, 709, 753, 754, 755, 792, 827, 915, 925, 926, 934, 936, 941, 948, 958, 1058.

Colorado Fuel and Iron Co. mine: See New Jersey-Morris Co., 843.

Colton: See New York-St. Lawrence Co., 875.

Columbia: See New Hampshire-Coos Co., 842.

Columbia College land: See New York City, New York-New York Co., 640.

Columbiana quadrangle: See Ohio-Columbiana and Mahoning Cos., 966.

Comet Collieries, Inc., mine 1.7 mi. E of Switz City: See Indiana-Greene Co., 967.

Comley Hall: See Pennsylvania-Chester Co., 766, 975.

Comly's quarry: See Philadelphia, Pennsylvania-Philadelphia Co., 665, 766, 1018.

Commonwealth of Pennsylvania property: See Pennsylvania-Carbon Co., 817.

Comstock: See New York-Washington Co., 875.

Concord granite: See New Hampshire-Hillsboro Co., 842.

Concord, Bickford, and related granites: See New Hampshire-General, 674.

Conemaugh formation: See Pennsylvania-General, 1011.

Conemaugh series: See Pennsylvania-General, 995.

Conesville quadrangle: See Ohio-Coshocton Co., 966.

Conifer: See Pennsylvania-Jefferson Co., 748.

Conklingville: See New York-Saratoga Co., 875.

Conklingville Dam: See New York-Saratoga Co., 875.

Connecticut Highway 4: See Connecticut-Litchfield Co., 842.

Connecticut, Massachusetts and, Highway 15: See Connecticut-Tolland Co. but see also Massachusetts-Worcester Co., 793.

Connecticut Highway 79: See Connecticut-New Haven Co., 842.

Connecticut Highway 80: See Connecticut-New Haven Co., 842.

Connecticut Highway 95: See Rhode Island-Washington Co., 842.

Connecticut Highway 142: See Connecticut-New Haven Co., 842.

Connecticut Highway 143: See Connecticut-New Haven Co., 842.

Connecticut Highway 341: See Connecticut-Litchfield Co., 842.

Connecticut River: See Connecticut-Middlesex Co., 716, 956. See Connecticut-New London Co., 716. See New Hampshire-Coos Co., 842. See also Vermont-Windham Co., 842.

Connecticut River, pegmatite veins: See Connecticut-General, 718.

"Connecticut white" granite: See Waterford (township), Connecticut-New London Co., 716, 718.

Connellsville quadrangle: See Pennsylvania-Fayette and Westmoreland Cos., 893.

Consolidated (Golding's) quarry: See Georgetown, Maine-Sagadahoc Co., 690.

Continental Village mines: See New York-Putnam Co., 843.

Conway: See New Hampshire-Carroll Co., 715, 716.

Conway biotite granite: See New Hampshire-Carroll Co., 842. See also White Mountains Alkaline Batholith, New Hampshire-Carroll Co., 673.

Conway granite: See New Hampshire-Belknap, Carroll, Coos, and Grafton Cos., 842.

Conway type, biotite granite: See New Hampshire-General, 674.

Conway Corners: See Conway, New Hampshire-Carroll Co., 715.

Conyngham quadrangle: See Pennsylvania-Luzerne and Schuylkill Cos., 1011.

Cook Shaft: See Mineville, New York-Essex Co., 850.

Cook shaft, Smith mine: See New York-Essex Co., 811.

Cooksie Coal Co. pits: See Illinois-Jackson Co., 894.

Cool Spring: See Pennsylvania-Jefferson Co., 748.

Cool Spring: See Providence, Rhode Island-Providence Co., 896.

Copper mine 9 mi. SW of Dover: See New Jersey-Morris Co., 843.

Copper City dump: See Michigan-Houghton Co., 992.

Copper Falls mine: See Michigan-Keweenaw Co., 991, 992.

Corbin quarry: See Glastonbury (township), Connecticut-Hartford Co., 716, 718.

Cornish: See Maine-York Co. but see also Maine-Cumberland Co., 877.

Cornwall: See New York-Orange Co., 821.

Cornwall: See Pennsylvania-Lebanon Co., 786.

Cornwall (township): See Connecticut-Litchfield Co., 716, 718.

Cornwall Bridge: See Connecticut-Litchfield Co., 842.

Corsica: See Pennsylvania-Jefferson Co., 748.

Cortlandt area near Peekskill: See New York-Westchester Co., 667.

Corundum mines on J. Patterson's farm: See Pennsylvania-Chester Co., 665.

Corundum Hill: See Pennsylvania-Chester Co., 766, 975.

Coshocton: See Ohio-Coshocton Co., 966.

Coulterville quadrangle: See Illinois-Randolph Co., 894.

Coventry (township): See Pennsylvania-Chester Co., 82.

Cowansville: See Pennsylvania-Armstrong Co., 893.

Coys Hill granite: See Massachusetts-General, 793.

Craig Harbor prospect: See New York-Essex Co., 843.

Cramer mine: See Pennsylvania-Jefferson Co., 748.

Cramer mine: See Strickland and Cramer mines, Connecticut-Middlesex Co., 690.

Cranberry Lake: See New York-St. Lawrence Co., 875.

Crane iron mine: See New Jersey-Morris Co., 660, 843, 846.

Crane Iron Co.: See New Jersey-Morris Co., 708.

Crane Iron Co. mine near Mt. Olive: See New Jersey-Morris Co., 708.

Cresaptowne iron ore (?): See Maryland-Washington Co., 935.

Crescent: See Ohio-Belmont Co., 966.

Crescent Lake: See Maine-Cumberland Co., 877.

Cretaceous sands: See Illinois-Pulaski Co., 823.

Crissey quarry: See Norfolk (township), Connecticut-Litchfield Co., 716, 718.

Crossenville: See Ohio-Perry Co., 966.

Croton Lake: See New York, Westchester Co., 846, 1021.

Crown Point: See New York-Essex Co., 807, 843, 879, 880.

Crown Point Spar Co.: See New York-Essex Co., 880.

Crown Point Spar Company quarry: See New York-Essex Co., 879.

Crown Point Street: See New York-Essex Co., 843.

Crozer's, Samuel, quarry: See Pennsylvania-Delaware Co., 766, 770, 911, 1018.

Crum Creek: See Pennsylvania-Delaware Co., 665, 766, 907, 908, 911, 1018.

Crump's quarry: See Pennsylvania-Delaware Co., 766, 1018.

Crump's quarry, No. 40: See Pennsylvania-Delaware Co., 665.

Crystal Dale: See New York-Lewis Co., 875.

Crystal Rock Spring: See Saratoga Springs, New York-Saratoga Co., 625, 869.

Cudnoski, Leo, well: See Wisconsin-Marinette Co., 796.

Culmerville: See Pennsylvania-Allegheny Co., 893.

Cumberland: See Maryland-Allegany Co., 935.

Cumberland: See Rhode Island-Providence Co., 723.

Curlsville: See Pennsylvania-Clarion Co., 893.

Curwensville quadrangle: See Pennsylvania-Clearfield Co., 748.

Cutting quarry: See Milford, Massachusetts-Worcester Co., 715, 716.

Cypress sandstone: See Illinois-Marion Co. & Indiana-Posey Co., 928, 929.

Cypress shale: See Illinois-Jefferson Co., 928, 929.

D

D or Lower Freeport coal: See Pennsylvania-Clearfield Co., 748.

D. H. Dell Hitchcock quarry: See Massachusetts-Norfolk Co., 746.

Dakin Hill member of Littleton formation: See Lovewell Mountain quadrangle, New Hampshire-Southwest Part, 772.

Dale: See Pennsylvania-Cambria Co., 893.

Dalton: See Massachusetts-Berkshire Co., 742.

Danbury: See Connecticut-Fairfield Co., 955, 968.

Danbury: See New Hampshire-Merrimack Co., 690, 886.

Danbury mine: See Danbury, New Hampshire-Merrimack Co., 690, 886.

Daniels Granite Co.: See Milford, New Hampshire-Hillsboro Co., 715.

Danielson quarry: See Glastonbury (township), Connecticut-Hartford Co., 716, 718.

Dannemora: See New York-Clinton Co., 843, 875.

Danville: See Pennsylvania-Montour Co., 935.

Danville quadrangle: See Illinois-Vermilion Co., 894.

Darlington: See Pennsylvania-Beaver Co., 748, 994.

Daugherty: See Pennsylvania-Cambria Co., 893.

Dave Edward drift mine: See Ohio-Lawrence Co., 966.

Davis: See Maryland-Howard Co., 888.

Davis', Amos, farm SW of West Chester: See Pennsylvania-Chester Co., 1018.

Davis (?) coal: See Illinois-Saline Co., 894.

Dawson quarry: See New Hampshire-Coos Co., 716.

Day: See Pennsylvania-Clarion Co., 893.

Day's, Loran, mine 2 mi. N of Newtonville: See Indiana-Spencer Co., 967.

DeKalb Junction: See New York-St. Lawrence Co., 947, 1025.

DeLuca emery mine: See New York-Westchester Co., 843.

DePere: See Wisconsin-Brown Co., 796.

DePeyster: See New York-St. Lawrence Co., 875.

Deardorf Fluorspar Mine: See Illinois-Hardin Co., 796.

Deckner Avenue well, Preble: See Wisconsin-Brown Co., 796.

Dedham granodiorite: See Massachusetts-Middlesex Co., 672.

"Deep Pit": See Rockport, Massachusetts-Essex Co., 715.

"Deep Pit" or "Old Pit": See Rockport, Massachusetts-Essex Co., 716.

Deepkill shale: See New York-Columbia Co., 875.

Deer Hill: See New York-Orange Co., 821.

Degonia Springs quadrangle: See Indiana-Warrick Co. but see also Indiana-Spencer Co., 967.

Degrasse: See New York-St. Lawrence Co., 843, 875.

Dekoven (?) coal: See Illinois-Saline and Williamson Cos., 894.

Delano: See New York-Essex Co., 807, 880.

Delano: See Pennsylvania-Schuylkill Co., 994, 1011.

Delano quadrangle: See Pennsylvania-Schuylkill Co., 1011.

Delauter Coal Co. strip mine: See Ohio-Mahoning Co., 966.

Delaware aqueduct, Shaft No. 7: See New York-Dutchess Co., 1030.

Delaware quarry: See Pennsylvania-Bucks Co., 995.

Delaware River: See New Jersey-General, 1005. See also New Jersey-Hunterdon Co., 1073, and New Jersey-Warren Co., 1071.

Delaware River: See Pennsylvania-General, 1005.

Delaware Water Gap: See Pennsylvania-Monroe Co., 935.

Delmont: See Pennsylvania-Westmoreland Co., 893, 1054.

Delta mine of Republic Coal and Coke Co.: See Illinois-Williamson Co., 894.

Delta Collieries Corp. abandoned strip mine: See Illinois-Williamson Co., 894.

Den quarry: See Massachusetts-Essex Co., 716.

Denmark: See Wisconsin-Brown Co., 796.

Densmore Creek: See New York-Monroe Co., 935.

Derby: See Vermont-Orleans Co., 716, 717, 854.

Derenberger mine: See New Jersey-Morris Co., 843.

Deshong's quarries: See Pennsylvania-Delaware Co., 665, 762, 766, 907, 911, 1018.

Devils Rock quarry: See Rockport, Massachusetts-Essex Co., 715, 716.

Devonian black shales: See New York-Western Part, 995.

Devonian limestone: See Illinois-Clinton Co., 928, 929.

Devonian shale: See New York-Albany and Greene Cos., 875.

Dickinson Center: See New York-Franklin Co., 875.

Dickinson Pond: See New York-Westchester Co., 843.

Dickinson's Mill: See Pennsylvania-Delaware Co., 766.

Dixie: See Ohio-Perry Co., 966.

Dixie Coal Co. strip mine: See Ohio-Perry Co., 966.

Dixon quarry: See Westerly, Rhode Island, Washington Co., 715, 716.

Dixville Notch: See New Hampshire-Coos Co., 842.

Dogwatch: See Illinois-Williamson Co., 894.

Donahue prospect: See Albany, Maine-Oxford Co., 887.

Donegal quadrangle: See Pennsylvania-Fayette and Westmoreland Cos., 893.

Dora: See Pennsylvania-Jefferson Co., 748.

Dorseys Run: See Maryland-Howard Co., 815.

Dorseys Run Station: See Maryland-Howard Co., 814.

Dover: See New Jersey-Morris Co., 843, 996.

Dover: See Ohio-Tuscarawas Co., 966.

Dover quadrangle: See Ohio-Carroll Co., 966.

Dover Plains: See New York-Dutchess Co., 875.

Doylestown: See Pennsylvania-Bucks Co., 1086.

Drews Hill: See Maine-Aroostook Co., 843.

Drews Hill sulfide prospects: See Maine-Aroostook Co., 843.

DuQuoin quadrangle: See Illinois-Jefferson Co., 894.

Duane: See New York-Franklin Co., 875.

Dubois quadrangle: See Pennsylvania-Clearfield and Jefferson Cos., 748.

Duffee quarry: See Barre, Vermont-Washington Co., 716, 717.

Dugger: See Indiana-Sullivan Co. but see also Indiana-Greene Co., 967.

Dugger quadrangle: See Indiana-Sullivan Co., 967.

Duluth gabbro: See Michigan-General, 992. See also Michigan-Keweenaw Co., 991.

Dundas: See Ohio-Vinton Co., 966.

Dundee: See Ohio-Tuscarawas Co., 966.

Dundee limestone: See Michigan-Osceola Co., 928, 929.

Dunkirk shale: See New York-Western Part, 995.

Dunlo: See Pennsylvania-Cambria Co., 893.

Dunmore III coal: See Pennsylvania-Lackawanna Co., 1011.

Dunton tourmaline deposit: See Maine-Oxford Co., 756.

Dunton tourmaline mine: See Newry, Maine-Oxford Co., 655.

Durham mines: See Pennsylvania-Bucks Co., 843.

Durham Furnace: See Pennsylvania-Bucks Co., 843.

Durham Furnace mines: See Pennsylvania-Bucks Co., 843.

Dykesville: See Wisconsin-Door Co., 796.

Dysart: See Pennsylvania-Cambria Co., 893.

Dysart Coal Co. drift mine: See Pennsylvania-Cambria Co., 893.

E

E or Upper Freeport coal: See Pennsylvania-Clearfield Co., 748.

E. E. Smith mine: See New Hampshire-Grafton Co., 886.

E. E. Smith upper mine: See Alexandria, New Hampshire-Grafton Co., 690.

E. F. Sheldon (samarskite discovery): See Connecticut-Middlesex Co., 913.

E. J. Longyear Co. drilling program: See Michigan-Baraga Co., 1047.

E. P. Tosh strip mine: See Pennsylvania-Westmoreland Co., 893.

Earl Carmen drift mine: See Ohio-Lawrence Co., 966.

Earth Products Company feldspar mine: See Maryland-Prince Georges Co., 777.

East quarry: See Milford, Massachusetts-Worcester Co., 715, 716.

East Bank well (DePere): See Wisconsin-Brown Co., 796.

East Blue Hill: See Maine-Hancock Co., 726.

East Bradford (township): See Pennsylvania-Chester Co., 82, 665, 766, 927, 975, 1018.

East Branch of Huron River: See Michigan-Baraga Co., 994.

East Branch of Passumpsic River: See Vermont-Caledonia Co., 716, 717.

East Brownfield: See Maine-Oxford Co., 877.

East Fairfield: See Ohio-Columbiana Co., 966.

East Glastonbury: See Glastonbury (township), Connecticut-Hartford Co., 754.

East Haddam: See Connecticut-Middlesex Co., 649.

East Hampton: See Connecticut-Middlesex Co., 934, 968.

East Lebanon: See Maine-York Co., 877.

East Lebanon-Milton Mills unnumbered highway: See Maine-York Co., 877.

East Milford: See Milford, New Hampshire-Hillsboro Co., 715.

East Nassau: See New York-Rensselaer Co., 875.

East Orland: See Maine-Hancock Co., 877.

East Otisfield: See Maine-Cumberland Co., 877.

East Pitcairn: See New York-St. Lawrence Co., 875.

East Pond: See New Hampshire-Carroll Co., 726.

East Providence: See Rhode Island-Providence Co., 896.

East Sebago: See Maine-Cumberland Co., 877.

East Stoneham: See Maine-Oxford Co., 887.

East Village: See Monroe (township), Connecticut-Fairfield Co., 934, 968.

East Waterford: See Maine-Oxford Co., 877.

East Windsor Hill, Hartford: See Connecticut-Hartford Co., 993.

Eastern Interior Coal Basin: See Illinois-General, 996.

Eastern Middle Field (a coal field): See Pennsylvania-General and Carbon, Luzerne, and Schuylkill Cos., 1011.

Eastern Point: See Massachusetts-Essex Co., 1008.

Eastern State Parkway: See Taconic Parkway, New York-Putnam Co., 1027, 1033.

Eastford gneiss: See Connecticut-Windham Co., 842.

Easton: See Pennsylvania-Northampton Co., 661, 669, 759, 843, 861, 863, 865, 873, 925, 983, 1012, 1013, 1018. ~~but see also Pennsylvania-Carbon Co., 1012.~~

Ebancho Brothers Coal Co. strip mine at Bouquet: See Pennsylvania-Westmoreland Co., 893.

Ebensburg quadrangle: See Pennsylvania-Blair and Cambria Cos., 893.

Echo Lake: See Massachusetts-Worcester Co., 715, 716 but see also Massachusetts-Middlesex Co., 715.

Eckerlein quarry: See Groton (township), Connecticut-New London Co., 716, 718.

Eckhart's Furnace: See Pennsylvania-Berks Co., 762.

Eden Coal Co. strip mine: See Pennsylvania-Allegheny Co., 893.

Edenville: See New York-Orange Co., 779, 810, 846, 920.

Edge Hill: See Pennsylvania-Montgomery Co., 665.

Edgewater: See New Jersey-Bergen Co., 745, 786.

Edinburg: See New York-Saratoga Co., 875.

Edison: See New Jersey-Sussex Co., 843, 846.

Edison quarry: See New Jersey-Warren Co., 843.

Edward, Dave, drift mine: See Ohio-Lawrence Co., 966.

Edward Johnson's strip mine: See Pennsylvania-Greene Co., 893.

Edwards: See New York-St. Lawrence Co., 875.

Edwardsport: See Indiana-Knox Co., 967.

Eightmile Hill: See Glastonbury (township), Connecticut-Hartford Co., 716, 718.

Eiler Hendrickson (uranium discovery): See Michigan-Baraga Co., 1051.

Elizabethtown: See New York-Essex Co., 843.

Ellenville: See New York-Ulster Co., 875.

Ellicott City: See Maryland-Howard Co., 781, 814, 815, 852.

Ellington quadrangle: See Connecticut-Tolland Co., 706.

Elliot, George, mine: See Rumford, Maine-Oxford Co., 887.

Ellis Ore Pits: See New York-Clinton Co., 843.

Ellsworth: See Maine-Hancock Co., 877.

Ely (township): See Michigan-Marquette Co., 970.

Embarrass: See Wisconsin-Waupaca Co., 796.

Emperor Spring: See Saratoga Springs, New York-Saratoga Co., 625, 730, 869.

Enfield: See New Hampshire-Grafton Co., 697.

Enfield Center: See New Hampshire-Grafton Co., 697.

Enfield (township): See New Hampshire-Grafton Co., 694.

Enos Coal Mining Co. mine 2.5 mi. E of Spurgeon: See Indiana-Pike Co., 967.

Enos Coal Mining Co. mine 3.8 mi. SW of Arthur: See Indiana-Pike Co., 967.

Eocene sand: See Maryland-Southern Part, 731.

Equality quadrangle: See Illinois-Gallatin and Saline Cos., 894.

Ernest Hamel farm: See Michigan-Marquette Co., 1064.

Ernest Wentworth mine in pegmatite: See Albany, Maine-Oxford Co., 887.

Esopus shale: See New York-Albany Co., 875.

Essex: See Connecticut-New London Co., 716.

Essex granite: See Cape Ann, Massachusetts-Essex Co., 802.

Essex turnpike: See Connecticut-Middlesex Co.,949.

Essex Wharf: See Lyme, Connecticut-New London Co., 718.

Eureka mine: See Upper Merryall, Connecticut-Litchfield Co., 1058.

Evans City: See Pennsylvania-Butler Co., 893.

Evans, Stuart, property: See Pennsylvania-Carbon Co., 817.

Eve, Mount: See New York-Orange Co., 921.

Everett drift mine: See Ohio-Vinton Co., 966.

F

Fabyn House: New Hampshire-Coos Co. but see New Hampshire-Carroll and Coos Cos., 842.

Fairchance: See Pennsylvania-Fayette Co., 893.

Fairmount: See Philadelphia, Pennsylvania-Philadelphia Co., 762, 908, 911, 1018.

Fairmount gneiss: See Pennsylvania-Delaware Co., 665.

Fairmount Park: See Philadelphia, Pennsylvania-Philadelphia Co., 665, 677, 758, 766, 862.

Fairmount waterworks: See Philadelphia, Pennsylvania-Philadelphia Co., 665.

Fairmount waterworks, Quarry opposite: See Philadelphia, Pennsylvania-Philadelphia Co., 1018.

Fairview Collieries Corp., Harmatton mine: See Illinois-Vermilion Co., 894.

Fall River: See Massachusetts-Bristol Co., 716.

"Fall River Gray" granite: See Massachusetts-Bristol Co., 716.

Falls and Clipper Mill Roads: See Baltimore, Maryland-Baltimore Co., 888.

Fannie Frost farm: See Maryland-Howard Co., 888.

Farmington: See New Hampshire-Strafford Co., 842.

Faunce: See Pennsylvania-Clearfield Co., 748.

Federal Hill: See Milford, New Hampshire-Hillsboro Co., 715.

Felch: See Michigan-Dickinson Co., 1067.

Felch (township): See Michigan-Dickinson Co., 970.

Felchville: See Vermont-Windsor Co., 918.

Fellows, Little or, mine: See Belvidere group, New Jersey-Warren Co., 843.

Fenner's Ledge: See Rhode Island-Providence Co., 896.

Fessenden quarry: See New Hampshire-Hillsboro Co., 716.

Fillow quarry: See Branchville, Connecticut-Fairfield Co., 948.

Fine: See New York-St. Lawrence Co., 843, 875.

Finleyville: See Pennsylvania-Bedford Co., 893.

Fire Road 10: See Sandy Hook, New Jersey-Monmouth Co., 844.

First Watchung basalt: See New Jersey-Somerset and Union Cos., 786.

First Watchung Mountain: See New Jersey-Union Co., 745.

First Watchung Mountain trap: See New Jersey-Union Co., 745.

Fisher's Lane: See Philadelphia, Pennsylvania-Philadelphia Co., 665.

Fisher quarry: See Topsham, Maine-Sagadahoc Co., 889.

Fishkill: See New York-Dutchess Co., 1030.

Fitchburg: See Massachusetts-Worcester Co., 672, 745, 746, 778, 800, 803, 925, 948.

Fitchburg granite: See Massachusetts-Worcester Co., 672, 745, 746.

Flanders: See Connecticut-Litchfield Co., 737.

Flat No. 2 Spring: See Saratoga Springs, New York-Saratoga Co., 625, 869.

Flatrock quarry: See Waterford (township), Connecticut-New London Co., 754, 934.

Flemington: See New Jersey-Hunterdon Co., 973, 1086.

Flemington (abandoned copper mine): See New Jersey-Hunterdon Co., 973.

Fletcher quarry: See Massachusetts-Middlesex Co., 793, 803, 804.

Fletcher quarry: See New Hampshire-Carroll Co., 716.

Fletcher, H. E., quarry, North Chelmsford: See Massachusetts-Middlesex Co., 745.

Fletcher, H. E., quarry, Milford: See Massachusetts-Worcester Co., 745.

Fletcher and Lahey quarry: See Conway, New Hampshire-Carroll Co., 715.

Flint clay: See Ohio-Belmont Co., 966.

Floyd Angle strip mine: See Ohio-Perry Co., 966.

Flushing: See Ohio-Belmont Co., 966.

Flushing quadrangle: See Ohio-Belmont Co., 966.

Flynt quarries: See Massachusetts-Hampden Co., 716.

Folly Cove: See Rockport, Massachusetts-Essex Co., 715.

Ford: See New Jersey-Morris Co., 785.

Ford Motor Company (drilling): See Michigan-Baraga Co., 994.

Forest of Dean mine: See New York-Orange Co., 843.

Forest Park (well): See Union City, Indiana-Randolph Co., 903.

Forestport: See New York-Oneida Co., 875.

Forsyth (township): See Michigan-Marquette Co., 970.

Forsyth-Carterville Coal Co. strip mine: See Illinois-Williamson Co., 894.

Fort Ann: See New York-Washington Co., 875.

Fort George: See New York City, New York- New York Co., 693.

Fort Hancock: See Sandy Hook, New Jersey-Monmouth Co., 844.

Fort Washington Avenue: See New York City, New York-New York Co., 652, 693, 784, 1021.

Foster Hill mine: See Stoneham, Maine, Oxford Co., 887.

Fowler: See New York-St. Lawrence Co., 875.

Fox Island: See Maine-Knox Co., 787.

Fox River: See Wisconsin-Brown and Outagamie Cos., 796.

Fox River Dairy well: See Wisconsin-Brown Co., 796.

Frackville: See Pennsylvania-Schuylkill Co., 994, 1011.

Franconia quadrangle: See New Hampshire-Grafton Co., 699.

Frankford: See Philadelphia, Pennsylvania-Philadelphia Co., 82, 665, 757, 766, 908, 909, 911, 1018.

Frankford (Barber's) quarry: See Philadelphia, Pennsylvania-Philadelphia Co., 665, 757, 766, 1018.

Frankford Creek: See Philadelphia, Pennsylvania-Philadelphia Co., 665, 766, 911.

Frankfort: See Pennsylvania-Washington Co., 893.

Franklin: See Maine-Hancock Co., 745, 746, 800, 803.

Franklin: See New Jersey-Sussex Co., 45, 670, 691, 700, 789, 798, 803, 808, 810, 843, 846, 890, 922, 924, 1041, 1043.

Franklin granite: See Maine-Hancock Co., 746.

Franklin limestone: See New Jersey-Sussex Co., 803, and New Jersey-Warren Co., 841, 843, 1069.

Franklin mine: See Hill mine, New Jersey-Sussex Co., 660.

Franklin Furnace: See New Jersey-Sussex Co., 660, 734, 785, 969, 997.

Franklin Furnace mine: See Franklin, New Jersey-Sussex Co., 846.

Franklin Square: See Ohio-Columbiana Co., 966.

Franks Coal Co. drift mine: See Pennsylvania-Westmoreland Co., 893.

Frazer quarry: See Westerly, Rhode Island-Washington Co., 715.

Frazer (formerly called Hall's) quarry: See Ryegate, Vermont-Caledonia Co., 717.

Fred Scribner mine: See Albany, Maine-Oxford Co., 887.

Freeburg: See Illinois-St. Clair Co., 894.

Freedom, Mount: See New Jersey-Morris Co., 846.

Freeland: See Pennsylvania-Luzerne Co., 1011.

Freeland quadrangle: See Pennsylvania-Luzerne Co., 1011.

Freeport coal: See Pennsylvania-Jefferson Co., 748.

Freeport coal bed: See Pennsylvania-General, 996.

Freeport, Upper, bed: See Pennsylvania-Clearfield Co., 995.

Freeport, Upper and Lower, coal beds: See Pennsylvania-General, 995.

French Creek: See Pennsylvania-Chester Co., 786.

French Lick: See Indiana-Orange Co., 730.

Frost, Fannie, farm: See Maryland-Howard Co., 888.

Frost Feldspar Quarry: See Maryland-Howard Co., 888.

Fruitland: See New York-Wayne Co., 935.

Fruitland ore pit: See New York-Wayne Co., 935.

Fryeburg: See Maine-Oxford Co., 877.

Fullerville Iron works: See New York-Essex Co., 843.

Fulton coal (correlative of Clarion coal): See Pennsylvania-Huntingdon Co., 893.

Furnace Point: See New York-Essex Co., 843.

Furnaceville iron ore member of Clinton formation: See New York-Cayuga, Monroe, and Wayne Cos., 935.

G

G. B. T. Coal Co. drift mine: See Pennsylvania-Cambria Co., 893.

G. H. Styles Co. strip mine: See Pennsylvania-Clarion Co., 893.

Galetti Coal Co. strip mine: See Pennsylvania-Westmoreland Co., 893.

Gallitzin: See Pennsylvania-Blair Co., 893.

Gardiner: See New York-Ulster Co., 875.

Garrett Park: See Maryland-Montgomery Co., 815.

Garrison: See New York-Putnam Co., 883.

Geary, R. A., or No. 1770 well: See Pennsylvania-Washington Co., 971.

Geiger's Quarry: See Pennsylvania-Lancaster Co., 216, 724.

General Crush Stone quarry: See Massachusetts-Middlesex Co., 745.

Genesee River gorge: See New York-Monroe Co., 935.

Gentryville: See Indiana-Spencer Co., 967, 996.

Gentryville, Road cut 1.8 mi. S of: See Indiana-Spencer Co., 967.

Gentryville coal: See Indiana-Southwest Part and Spencer Co., 967.

George Elliot mine: See Rumford, Maine-Oxford Co., 887.

George Sieserman well (Seymour): See Wisconsin-Outagamie Co., 796.

George T. Brown Coal Co. strip mine: See Pennsylvania-Indiana Co., 893.

George Treml well (Shirley): See Wisconsin-Brown Co., 796.

George Washington Bridge: See New Jersey-Bergen Co., 688.

Georgetown: See Maine-Sagadahoc Co., 690.

Germantown: See Philadelphia, Pennsylvania-Philadelphia Co., 665, 766.

Geyser Spring: See Saratoga Springs, New York-Saratoga Co., 625, 657, 730, 869.

Gibbs (discovery): See New Jersey-Sussex Co., 670.

Gibson Coal Co. strip mine: See Pennsylvania-Cambria Co., 893.

Gilbertville: See Massachusetts-Hampshire Co., 738.

Gilchrest Coal Co. drift mine: See Ohio-Athens Co., 966.

Gilead: See Maine-Oxford Co., 877.

Gilford: See New Hampshire-Belknap Co., 842.

Gillespie: See Pennsylvania-Fayette Co., 893.

Gillespie Coal Co. mine 1 mi. SW of Clay City: See Indiana-Clay Co., 967.

Gillette quarry: See Haddam Neck, Connecticut-Middlesex Co., 725, 754, 764, 974, 1078, 1080.

Gilmore mine: See Kensington Mica Mine, Maryland-Montgomery Co., 888, 940.

Gilsum: See New Hampshire-Cheshire Co., 856, 857.

Gingrich No. 3 well of Pure Oil Co.: See Michigan-Osceola Co., 664.

Girard Avenue bridge: See Philadelphia, Pennsylvania-Philadelphia Co., 910, 1018.

Girard's Hatchery: See Providence, Rhode Island-Providence Co., 896.

Girton Coal Co. mine 2.6 mi. W of Carbon: See Indiana-Clay Co., 967.

Girton Coal Co. mine 2.5 mi. N of Seelyville: See Indiana-Vigo Co., 967.

Glasgow: See Pennsylvania-Cambria Co., 893.

Glastonbury: See Glastonbury (township), Connecticut-Hartford Co., 7.

Glastonbury (township): See Connecticut-Hartford Co., 7, 690, 706, 716, 718, 776, 881, 883, 916, 925, 934, 948, 968, 1012.

Glastonbury gneiss: See Connecticut-Tolland Co., 706.

Glastonbury gneiss, pegmatites in: See Glastonbury (township), Connecticut-Hartford Co., 706.

Glastonbury granite gneiss: See Connecticut-Middlesex Co., 753.

Glastonbury Granite Works quarry: See Glastonbury (township), Connecticut-Hartford Co., 716.

(The) Glen: See New York-Warren Co., 875.

Glen Gardner: See New Jersey-Hunterdon Co., 973.

Gloucester: See Massachusetts-Essex Co., 672.

Gogebic Creek: See Michigan-Upper Peninsula and Michigan-Gogebic Co., 1044.

Gogebic Range: See Michigan-Gogebic Co., 745, 746, 798, See also Wisconsin-General, 800.

Gogebic Range sill: See Michigan-Gogebic Co., 745.

Gold Diggings prospect: See New Jersey-Morris Co., 843.

Golding's quarry: See Consolidated quarry, Georgetown, Maine-Sagadahoc Co., 690.

Golding-Keene mine: See Alstead, New Hampshire-Cheshire Co., 650, 859.

Goodnough, Myron, farm: See Cabot, Vermont-Washington Co., 717.

Goodrich quartzite: See Michigan-Marquette Co., 841, 995.

Goodrich Falls: See White Mountains Alkaline Batholith, New Hampshire-Carroll Co., 673.

Goos quarry: See Waterford (township), Connecticut-New London Co., 718.

Gorman quarry: See Glastonbury (township), Connecticut-Hartford Co., 718.

Gorton: See Pennsylvania-Centre Co., 748.

Gosselin Granite Co.: See Vermont-Windsor Co., 855.

Gourlay Granite Works: See Bradford, Rhode Island-Washington Co., 715.

Gouverneur: See New York-St. Lawrence Co., 713, 828, 830, 831, 875.

Grafton: See New Hampshire-Grafton Co., 70, 651, 658, 690, 745, 746, 859, 883, 886, 958, 963, 1061.

Grafton: See New York-Rensselaer Co., 875.

Grafton Center: See New Hampshire-Grafton Co., 646, 647, 648, 757, 830, 943, 946, 948, 974, 1053.

Grafton mine: See New Hampshire-Grafton Co., 651.

Granite Quarry(Middle Inlet): See Wisconsin-Marinette Co., 796.

Graniteville: See Massachusetts-Middlesex Co., 793.

Grannas Brothers Coal Co. strip mine: See Pennsylvania-Cambria Co., 893.

Granville: See New York-Washington Co., 875.

Grape Creek (No. 6?) coal: See Illinois-Vermilion Co., 894.

Grape Creek Coal Co. strip mine: See Illinois-Vermilion Co., 894.

Graphite: See New York-Warren Co., 875.

Graphite mine in Arlington: See Rhode Island-Providence Co., 896.

Graphite quarry: See Michigan-Baraga Co., 995.

Grass River: See New York-St. Lawrence Co., 875.

Grasso Coal Co. strip mines at Day and E of Clarion: See Pennsylvania-Clarion Co., 893.

Gray Street well (Green Bay): See Wisconsin-Brown Co., 796.

Gray's Ferry: See Philadelphia, Pennsylvania-Philadelphia Co., 910.

Greasy Ridge: See Ohio-Lawrence Co., 966.

Greasy Ridge Coal Co. strip mine: See Ohio-Lawrence Co., 966.

Greatens, Clarence, well (Green Bay): See Wisconsin-Brown Co., 796.

Green Bay: See Wisconsin-Brown Co., 796.

Green Bay and Western Railroad well (Casco Junction): See Wisconsin-Door Co., 796.

Green Coal Co. strip mine: See Pennsylvania-Fayette Co., 893.

Green prospect: See New York-St. Lawrence Co., 843.

Green, W., Fluorspar Mine: See Illinois-Hardin Co., 796.

Green's, Peter, farm: See Pennsylvania-Delaware Co., 766.

Greenbank Coal Co. drift mine: See Pennsylvania-Cambria Co., 893.

Greensboro: See Pennsylvania-Fayette Co., 893.

Greensburg and Connelsville Coal and Coke Co. strip mine: See Pennsylvania-Washington Co., 893.

Greensburg quadrangle: See Pennsylvania-Westmoreland Co., 893.

(The) Greenstone: See Michigan-Keweenaw Co., 991.

Greenville: See New Hampshire-Hillsboro Co., 842.

Greenwich: See Connecticut-Fairfield Co., 716, 718.

Greenwich: See Massachusetts-Hampshire Co., 849, 925.

Greenwich blue-black granite: See Connecticut-Fairfield Co., 716, 718.

Greenwood: See Maine-Oxford Co., 690, 848, 887, 988.

Greenwood Lake: See New Jersey-Passaic Co., 843.

Grenville hornblende gneiss: See New York-Essex Co., 843.

Grenville limestone: See New York-Essex Co., 843.

Grenville mixed gneisses: See New York-Essex and Hamilton Cos., 644.

Grenville series: See New York-Essex, Hamilton, Herkimer, St. Lawrence, Saratoga, and Warren Cos., 875.

Greylock, Mount: See Massachusetts-Berkshire Co., 793.

Greylock schist: See Massachusetts-Berkshire Co., 793.

Grimsby sandstone: See New York-Monroe Co., 935.

Grindstone: See Pennsylvania-Fayette Co., 893.

Groton (township): See Connecticut-New London Co., 716, 718.

Groton: See New Hampshire-Grafton Co., 70, 690, 859, 886.

Groton: See Vermont-Caledonia Co., 716, 717, 1020.

Groton granite: See Groton (township), Connecticut-New London Co., 718.

Groveton station: See New Hampshire-Coos Co., 716.

Guilford: See Maryland-Howard Co., 781, 815.

Gunpowder River: See Maryland-Baltimore Co., 814.

Gunpowder River, west bank: See Maryland-Baltimore Co., 888.

Guttenberg: See New Jersey-Hudson Co., 745, 786.

Guy Johnson mine: See Albany, Maine-Oxford Co., 690.

Guy Johnson prospect: See Albany, Maine-Oxford Co., 887.

H

H. C. Horner Coal Co. drift mine: See Pennsylvania-Cambria Co., 893.

H. E. Fletcher Co. quarry, North Chelmsford: See Massachusetts-Middlesex Co., 745.

H. E. Fletcher quarry, Milford: See Massachusetts-Worcester Co., 745.

Hacklebarney group of mines: See New Jersey-Morris Co., 843.

Haddam: See Connecticut-Middlesex Co., 725, 753, 836, 916, 934, 948, 950, 968, 976, 1035, 1053.

Haddam Neck: See Connecticut-Middlesex Co., 679, 764, 788, 915, 925, 934, 968, 974, 1078.

Hague: See New York-Warren Co., 875.

Haines' farm: See Pennsylvania-Berks Co., 729.

Hairpin Turn: See Massachusetts-Berkshire Co., 793.

Hale (or Andrews) quarry: See Portland, Connecticut-Middlesex Co., 78, 82, 747, 753, 754, 755, 776, 827, 836, 912, 914, 925, 934, 948, 976, 1031.

Hale-Walker prospect: See Portland, Connecticut-Middlesex Co., 690.

Hall's Quarry: See Glastonbury (township), Connecticut-Hartford Co., 7.

Hall's quarry: See Frazer quarry, Vermont-Caledonia Co., 717.

Hall's Ridge: See Newry, Maine-Oxford Co., 858, 962, 984.

Hamdon Hill: See Maine-Oxford Co., 822.

Hamel, Ernest, farm: See Michigan-Marquette Co., 1064.

Hamilton: See Pennsylvania-Jefferson Co., 748.

Hammonasset River: See Connecticut-Middlesex Co., 949.

Hammond Iron Mine: See New York-Essex Co., 947.

Hammond quadrangle: See New York-Jefferson and St. Lawrence Cos., 683.

Hammondville: See New York-Essex Co., 947.

Hammondville mines: See New York-Essex Co., 843.

Hampton: See New York-Washington Co., 875.

Hannawa Falls: See New York-St. Lawrence Co., 875.

Hanover: See New Hampshire-Grafton Co., 745.

Hardwick: See Massachusetts-Worcester Co., 739.

Hardwick: See Vermont-Caledonia Co., 716, 717.

Hardwick granite: See Massachusetts-General, 793, Massachusetts-Worcester Co., 739. See also Vermont-Caledonia Co., 716.

Hardyston (township): See New Jersey-Sussex Co., 660.

Harford Road: See Maryland-Baltimore Co., 888.

Harlansburg: See Pennsylvania-Lawrence Co., 893.

Harlem River Speedway: See New York City, New York-New York Co., 884.

Harmatton mine of Fairview Collieries Corp.: See Illinois-Vermilion Co., 894.

Harndon Hill: See Stoneham, Maine-Oxford Co., 655, 962.

Harold Brewer's strip mine: See Pennsylvania-Armstrong Co., 893.

Harrington: See Maine-Washington Co., 787.

Harrington Lake: See Maine-Piscataquis Co., 877.

Harris Coal Co. mine 5.5 mi. W of Newport: See Indiana-Vermillion Co., 967.

Harris' soapstone quarry: See Massachusetts-Franklin Co., 738.

Harrisburg: See Illinois-Saline Co., 894.

Harrisburg Coal Co. slope mine: See Illinois-Williamson Co., 894.

Harrisburg No. 5 coal: See Illinois-Gallatin, Jackson, Jefferson, Saline, and Williamson Cos., 894.

Harrisburg quadrangle: See Illinois-Saline and Williamson Cos., 894.

Harrisburg, 2 mi. N of: See Pennsylvania-Perry Co., 935.

Harrison: See Maine-Cumberland Co., 877.

Harrisville: See New York-Lewis Co., 875.

Harry Liebergen well (DePere): See Wisconsin-Brown Co., 796.

Harry Thwaites farm: See Maine-Aroostock Co., 843.

Hartford: See Connecticut-Hartford Co., 932, 993.

Hartford: See New York-Washington Co., 875.

Harvard quarry: See Greenwood, Maine-Oxford Co., 690.

Harwood: See Pennsylvania-Luzerne Co., 1011.

Hastings: See Pennsylvania-Cambria Co., 893.

Hatfield: See Massachusetts-Hampshire Co., 641, 738.

Hatfield tonalite: See Massachusetts-Hampshire Co., 738.

Hathorn No. 1 Spring: See Saratoga Springs, New York-Saratoga Co., 625, 657, 869.

Hathorn No. 2 Spring: See Saratoga Springs, New York-Saratoga Co., 625, 657, 730, 869.

Hathorn No. 3 Spring: See Saratoga Springs, New York-Saratoga Co., 625, 657, 869.

Haverford (township): See Pennsylvania-Delaware Co., 665, 766.

Haverhill Center: See New Hampshire-Grafton Co., 716.

Hawkinsville: See New York-Oneida Co., 875.

Hayden quarry: See Milford, New Hampshire-Hillsboro Co., 715.

Hayden Row: See Hopkinton, Massachusetts-Middlesex Co., 715, 716.

Hazelton: See Pennsylvania-Luzerne Co., 1011.

Hazelton quadrangle: See Pennsylvania-Carbon and Luzerne Cos., 1011.

Heacock's quarry: See Pennsylvania-Montgomery Co., 665, 766, 911, 1018.

Hebron: See Maine-Oxford Co., 877, 887.

Helvetia: See Pennsylvania-Clearfield Co., 748.

Hemlock Crystal Falls: See Michigan-Iron Co., 992.

Henderson: See Pennsylvania-Clearfield Co., 748.

Henderson Lake: See New York-Essex Co., 843.

Henderson Hill manganese prospect: See Maine-Aroostook Co., 843.

Hendrickson, Eiler (uranium discovery): See Michigan-Baraga Co., 1051.

Henry Hamp, Jr. No. 1 well: See Illinois-Hardin Co., 680.

Hepfelfinger Coal Co. strip mine at Cowansville: See Pennsylvania-Armstrong Co., 893.

Hermon: See New York-St. Lawrence Co., 875.

Hermon granite: See New York-Jefferson Co., 875.

Hermon type granite: See New York-Jefferson and St. Lawrence Cos., 875.

Herrin No. 6 coal: See Illinois-General and Illinois-Jackson, Jefferson, Perry, Randolph, St. Clair, Saline, and Williamson Cos., 894.

Herrin quadrangle: See Illinois-Williamson Co., 894.

Hibbs mine: See Hebron, Maine-Oxford Co., 887.

Hibernia anomaly: See New Jersey-Morris Co., 996.

Hibernia mines: See New Jersey-Morris Co., 876.

Hicks Coal Co. mine 2.6 mi. S of Cannelsburg: See Indiana-Daviess Co., 967.

Hicks Dome: See Illinois-Hardin Co., 680.

Higbee Beach: See New Jersey-Cape May Co., 844.

High Bridge Mine: See New Jersey-Hunterdon Co., 843.

Highland: See New York-Ulster Co., 875.

Highland Falls: See New York-Orange Co., 842.

Highlandcroft magma series: See New Hampshire-General, 674, 996.

Hill (or Franklin) mine: See New Jersey-Sussex Co., 660.

Hill, J.W. (radioactivity determinations): See Illinois-Hardin Co., 680.

Hilliards: See Pennsylvania-Butler Co., 893.

Hilliards quadrangle: See Pennsylvania-Butler Co., 893.

Hinckley Reservoir: See New York-Oneida Co., 875.

Hinsdale: See Massachusetts-Berkshire Co., 739, 741, 742.

Hinsdale gneiss: See Massachusetts-Berkshire Co., 739.

Hippel Coal Co. strip mine: See Ohio-Vinton Co., 966.

Hiram: See Maine-Oxford Co. but see also Maine-Cumberland Co., 877.

Hitchcock, D. H. Dell, quarry: See Massachusetts-Norfolk Co., 746.

Hitner's, H. A., Sons Co.: See Conway, New Hampshire-Carroll Co., 715.

Hoadley Neck: See Branford, Connecticut-New Haven Co., 716.

Hoadley Point quarries: See Branford, Connecticut-New Haven Co., 934.

Hobby quarry: See Bedford, New York-Westchester Co., 846.

Hoffman's quarry: See Philadelphia, Pennsylvania-Philadelphia Co., 665, 766, 1018.

Hofrichter Coal Co. slope mine: See Pennsylvania-Washington Co., 893.

Holland Furnace: See New York-Westchester Co., 843.

Holly, Mount: See New Jersey-Burlington Co., 843.

Holmes coal: See Pennsylvania-Schuylkill Co., 1011.

Homecamp: See Pennsylvania-Clearfield Co., 748.

Homer City: See Pennsylvania-Indiana Co., 893.

Hometown: See Pennsylvania-Carbon Co., 994.

Homewood: See Pennsylvania-Beaver Co., 748.

Honey Grove: See Pennsylvania-Juniata Co., 935.

Hooper's Ledge feldspar quarry: See Maine-Oxford Co., 962.

Hoosac River: See Williamstown, Massachusetts-Berkshire Co., 959.

Hoosac schist: See Massachusetts-Berkshire Co., 793.

Hopkinton: See Massachusetts-Middlesex Co., 715, 716.

Hopkinton: See New York-St. Lawrence Co., 875.

Hopkinton quarry: See Hopkinton, Massachusetts-Middlesex Co., 715, 716.

Hornerstown formation: See New Jersey-Burlington Co., 843.

Horrock' quarry: See Philadelphia, Pennsylvania-Philadelphia Co., 665, 766.

Horse Race Rapid: See Michigan-Menominee and Marquette Cos., 1022.

Hortonville: See Wisconsin-Outagamie Co., 796.

Hottle spring: See Bloomington, Indiana-Monroe Co., 903, 905, 906.

Houghton: See Maine-Oxford Co. but see also Maine-Franklin Co., 877.

Houlton: See Maine-Aroostook Co., 843.

Housatonic Highlands: See Connecticut-Litchfield Co., 842.

Housatonic River: See Connecticut-Litchfield Co., 842.

Houtzdale: See Pennsylvania-Clearfield Co., 748.

Houtzdale quadrangle: See Pennsylvania-Clearfield Co., 748.

Hoyman's M. D., strip mine: See Pennsylvania-Westmoreland Co., 893.

Hubbard Hill member of Littleton formation: See Lovewell Mountain quadrangle, New Hampshire-Southwest Part, 772, and New Hampshire-Sullivan Co., 695.

Hubbardston granite: See Connecticut-Tolland Co. and Massachusetts-General, 793. See also New Hampshire-Hillsboro Co., 842.

Huberta Coal Co. strip mine: See Ohio-Jefferson Co., 966.

Hudson and Chester quarry: See Massachusetts-Berkshire Co., 716, but see also Massachusetts-Berkshire-Hampden Cos., 715.

Hudson Highlands: See New York-Orange and Westchester Cos., 842, 1005.

Hudson River: See New York-General and United States - General, 722.

Hudson River formation: See New York-Columbia and Orange Cos., 875.

Hudson River group: See New York-Dutchess and Ulster Cos., 875.

Hudson River pelite: See New York-Dutchess Co., 875.

Hudson River schist: See New York-Columbia Co., 875.

Hudson River Snake Hill formation: See New York-Orange and Ulster Cos., 875.

Hudson Valley: See New York-General and New York-Columbia, Dutchess, Orange, Rensselaer, Saratoga, Ulster, and Washington Cos., 875.

Hughes, C. A., Coal Co. strip mine: See Pennsylvania-Cambria Co., 893.

Humboldt (township): See Michigan-Marquette Co., 970.

Huntingdon: See Pennsylvania-Huntingdon Co., 935.

Huntington: See Massachusetts-Hampshire Co., 738, 739, 797.

Huron Mts.: See Michigan-Baraga Co., 1003.

Huron River: See Michigan-Baraga Co., 995, 1049, 1051.

Huron River area: See Michigan-Baraga Co., 841, 994.

Huron River gorge: See Michigan-Baraga Co., 267.

Huron shale: See Ohio-General, 824.

Hurricane gold mine: See White Mountains Alkaline Batholith, New Hampshire-Carroll Co., 673.

Hurricane Island: See Maine-Knox Co., 858, 898, 899.

Hurricane Mountain: See White Mountains Alkaline Batholith, New Hampshire-Carroll Co., 673.

Husband quarry: See Glastonbury (township), Connecticut-Hartford Co., 753, 934.

Hutchins Hill: See Alexandria, New Hampshire-Grafton Co., 690.

Hutchinson Pond: See Albany, Maine-Oxford Co., 887.

Hutchinson River Parkway: See New York-Westchester Co., 1070.

Hutzel, Wm. H., Coal Co. drift mine: See Pennsylvania-Indiana Co., 893.

Hyde: See Pennsylvania-Clearfield Co., 748.

Hyde granite mass: See New York-St. Lawrence Co., 683.

Hymera: See Indiana-Sullivan Co., 967.

Hymera quadrangle: See Indiana-Sullivan Co., 967.

I

I. B. spring: See Morning Sun, Ohio-Preble Co., 903.

Ilchester: See Maryland-Howard Co., 780, 781, 782, 814, 815, 852, 898, 899.

Ilchester, Vicinity of: Maryland-Howard Co. but see Maryland-Baltimore Co., 888.

Ilchester granite: See Maryland-Baltimore Co., 852, and Maryland-Howard Co., 781.

Illinois Basin: See Illinois-General, 819.

Illinois Central spring: See Bloomington, Indiana-Monroe Co., 903, 905, 906.

Imperial: Pennsylvania-Allegheny Co. but see Pennsylvania-Washington Co., 971.

Indian Lake: See New York-Hamilton Co., 875.

Indian River: See New York-Lewis and St. Lawrence Cos., 875.

Indiana quadrangle: See Pennsylvania-Indiana Co., 893.

Inlet: New York-Hamilton Co. but see New York-Herkimer Co., 875.

Iola: See Illinois-Clay Co., 894.

Iola Stone Co. strip mine: See Illinois-Clay Co., 894.

Iron River District: See Michigan-Iron Co., 995.

Irondequoit: See New York-Monroe Co., 935.

Ironton quadrangle: See Ohio-Lawrence Co., 966.

Iseman Coal Co. strip mine S of New Bethlehem: See Pennsylvania-Armstrong Co., 893.

Iseman Coal Co. strip mines S and E of South Bethlehem: See Pennsylvania-Armstrong Co., 893.

Isham, Thad D., uranium lease: See Michigan-Dickinson Co., 1048.

Ishpeming: See Michigan-Marquette Co., 1074.

Ishpeming (township): See Michigan-Marquette Co., 970.

Island Beach: See New Jersey-Ocean Co., 844.

Island Pond: See Vermont-Essex Co., 842.

Island, Center or, Pond: See Vermont-Caledonia Co., 716.

Island Spring: See Saratoga Springs, New York-Saratoga Co., 625, 869.

J

J. C. S. Old spring: See Bloomington, Indiana-Monroe Co., 903.

J. C. S. spring: See Bloomington, Indiana-Monroe Co., 903, 906.

J. E. Santella's Mine Co. drift mine: See Pennsylvania-Westmoreland Co., 893.

J. P. Coal Co. drift mine: See Pennsylvania-Westmoreland Co., 893.

J. S. R. Farm well: See Morning Sun, Ohio-Preble Co., 903.

Jackson: See Ohio-Jackson Co., 966.

Jackson mine: See New Jersey-Morris Co., 843.

Jackson quadrangle: See Ohio-Jackson Co., 966.

Jackson Falls: See White Mountains Alkaline Batholith, New Hampshire-Carroll Co., 673.

J. & C. Coal Co. drift mine: See Pennsylvania-Westmoreland Co., 893.

James Brothers Coal Co. strip mine near Lindentree: See Ohio-Carroll Co., 966.

James Brothers Coal Co. strip pit: See Ohio-Carroll Co., 994.

James E. Leitch, uranium lease: See Michigan-Dickinson Co., 1048.

Jan Peck Bridge: See New York-Westchester Co., 843.

Jasonville: See Indiana-Greene Co., 967.

Jasonville quadrangle: See Indiana-Greene Co., 967.

Jay granite: See Maine-Franklin-Kennebec-Somerset Cos., 984.

Jay-Norridgewock area: See Maine-Franklin-Kennebec-Somerset Cos., 984.

Jayville: See New York-St. Lawrence Co., 785.

Jayville mines: See New York-St. Lawrence Co., 843.

Jeanette: See Pennsylvania-Westmoreland Co., 893.

Jeff Mining Co. drift mine: See Pennsylvania-Allegheny Co., 893.

Jefferson: New Hampshire-Coos Co. but see New Hampshire-Carroll and Coos Cos., 842.

Jefferson: See Pennsylvania-Greene Co., 893.

Jenkins, Carl, well (Suamico): See Wisconsin-Brown Co., 796.

Jenkintown: See Pennsylvania-Montgomery Co., 665, 766, 911, 1018.

Jennertown: See Pennsylvania-Somerset Co., 893.

Jermyn: See Pennsylvania-Lackawanna Co., 1011.

Jim Thorpe (formerly Mauch Chunk): See Pennsylvania-Carbon Co., 7, 20, 78, 82, 444, 509, 635, 733, 762, 765, 766, 817, 841, 867, 874, 883, 917, 995, 1005, 1015, 1016, 1017, 1018, 1042, 1059, 1075, 1076, 1077, 1078, 1081, 1083, 1084, 1085, 1087.

Joe Baker strip mine: See Ohio-Monroe Co., 966.

John Collin well (Dykesville): See Wisconsin-Door Co., 796.

John Lobiskis mine: See West Peru, Maine-Oxford Co., 887.

John Ridzun drift mine: See Ohio-Jefferson Co., 966.

John Smith's farm E of Black Horse: See Pennsylvania-Delaware Co., 1018.

John Thomas Coal Co. drift mine: See Pennsylvania-Westmoreland Co., 893.

Johnsburg: See New York-Warren Co., 875.

Johnson, Guy, mine: See Albany, Maine-Oxford Co., 690.

Johnson, Guy, prospect: See Albany, Maine-Oxford Co., 887.

Johnson Logging Camp: See Michigan-Menominee and Marquette Cos., 1022.

Johnson Mountain: See New York-Clinton Co., 843.

Johnson Quarry: See Massachusetts-Essex Co., 803.

Johnson's, Edward, strip mine: See Pennsylvania-Greene Co., 893.

Johnson's quarry: See Pennsylvania-Delaware Co., 665, 766, 832, 1018.

Johnston: See Rhode Island-Providence Co., 896.

Johnstown quadrangle: See Pennsylvania-Somerset Co., 893.

Joliet: See Illinois-Will Co., 714, 1065, 1068.

Joliett: See Pennsylvania-Schuylkill Co., 1011.

Jonathon Rohrbach farm: See Pennsylvania-Berks Co., 1089.

Jones and Laughlin Ore Company: See Michigan-Baraga Co., 994, 1066.

Jones and Laughlin Ore Co. property: See Michigan-Baraga Co., 1050, 1051.

Jones and Laughlin Ore Co. uranium lease: See Michigan-Baraga Co., 1048.

Jones and Laughlin Steel Corp.: See Michigan-Marquette Co., 1064, and Michigan-Upper Peninsula, 1066. See also New York-St. Lawrence Co., 843.

Jones and Laughlin Steel Corp. uranium lease: See Michigan-Baraga Co., 1047.

Jones Dark quarry: See Vermont-Orange Co., 716.

Jones Falls: See Baltimore, Maryland-Baltimore Co., 888.

Jones Falls at 29 Street bridge: See Baltimore, Maryland-Baltimore Co., 888.

Jones Falls Gneiss Quarries: See Baltimore, Maryland-Baltimore Co., 888.

Joseph Newall and Co.: See Bradford, Rhode Island-Washington Co., 715.

Joshua Rock: See Lyme (township), Connecticut-New London Co., 716, 718.

Joshua Rock quarry: See Lyme (township), Connecticut-New London Co., 716, 718.

Joy, Mount: See Pennsylvania-Westmoreland Co., 893.

Judge Leiper's quarry: See Pennsylvania-Delaware Co., 907.

Judge Peters' quarry: See Philadelphia, Pennsylvania-Philadelphia Co., 665, 907.

Junction: See Illinois-Gallatin Co., 894.

Junction of Maine Highways 5 and 25: See Maine-York Co., 877.

Junction of Maine Highways 5 and 113: See Maine-Cumberland Co., 877.

Junction of Maine Highways 11 and 113: See Maine-Cumberland Co., 877.

Junction of Maine Highways 119 and 121: See Maine-Androscoggin Co., 877.

K

K. & D. Coal Co. strip mine: See Pennsylvania-Indiana Co., 893.

Kahart mine: See New Jersey-Morris Co., 843.

Kanizer Brothers Coal Co. mine 3 mi. NE of Clinton: See Indiana-Vermillion Co., 967.

Karthus quadrangle: See Pennsylvania-Clearfield Co., 748.

Katahdin Iron Works: See Maine-Piscataquis Co., 843.

Kaukauna: See Wisconsin-Outagamie Co., 796.

Kearney Hill quarry: See Kirby, Vermont-Caledonia Co., 717.

Kearsarge: See New Hampshire-Carroll Co., 842.

Kearsarge lode: See Michigan-Houghton Co., 992.

Keck's, C. F., drift mine: See Pennsylvania-Westmoreland Co., 893.

Keefer sandstone: See Pennsylvania-Huntingdon Co., 825, 826, 935.

Keefer sandstone(?): See Pennsylvania-Centre Co., 935.

Keefer sandstone (Clinton iron ore): See Pennsylvania-Union Co., 935.

Keene: See New Hampshire-Cheshire Co., 842. See also Lovewell Mountain quadrangle, New Hampshire-Southwest Part, 772.

Keene: See New York-Essex Co., 875.

Keewaydin: See Pennsylvania-Clearfield Co., 748.

Kelley coal (correlative of Upper Freeport coal): See Pennsylvania-Bedford Co., 893.

Kelt quarry: See Bedford, New York-Westchester Co., 846.

Kemper, Collin, estate: See New York-Westchester Co., 1029.

Kennard Ledge quarry: See New Hampshire-Merrimack Co., 716.

Kensington Mica Mine (formerly Gilmore mine): See Maryland-Montgomery Co., 888, 940, 990.

Kent: See Connecticut-Litchfield Co., 842.

Kentucky-Illinois fluorspar mining district: See Illinois-General, 928, 929.

Kerrmoor: See Pennsylvania-Clearfield Co., 748.

Kerry's Coal Co. strip mine: See Pennsylvania-Butler Co., 893.

Keweenaw Point (used to represent entire Keweenaw peninsula here): See Michigan-Houghton Co., 829. See also Michigan-Houghton and Keweenaw Cos. and Michigan-Upper Peninsula, 991.

Keweenawan basalts: See Michigan-Houghton and Keweenaw Cos., 991.

Kezar Falls: See Maine-Oxford Co., 877.

Kezar Lake: See Maine-Oxford Co., 931.

Kifer's, Wilbur, drift mine: See Pennsylvania-Fayette Co., 893.

Killingworth: See Connecticut-Middlesex Co., 968.

Kimbal Pond: See New Hampshire-Carroll Co., 842.

Kimberly: See Ohio-Athens Co., 966.

Kimberly-Carbondale road: See Ohio-Athens Co., 966.

Kimbs, Walter, well (Mills Center): See Wisconsin-Brown Co., 796.

Kingman: See Indiana-Fountain Co., 967.

Kingston: See New Jersey-Somerset Co., 745, 786.

Kinkel, P. H., mines and quarries: See Bedford, New York-Westchester Co., 634, 838, 839, 846, 879.

Kinsman quartz monzonite: See New Hampshire-General, 674, and Lovewell Mountain quadrangle, New Hampshire-Southwest Part, 772. See also New Hampshire-Grafton Co., 842, and see New Hampshire-Sullivan Co., 695.

Kirby: See Vermont-Caledonia Co., 717.

Kirby Mountain: See Vermont-Caledonia Co., 717.

Kirschnerville: See New York-Lewis Co., 875.

Kittanning: See Pennsylvania-Armstrong Co., 893.

Kittanning coal bed: See Pennsylvania-General, 996.

Kittanning, Upper, Middle, and Lower, coal beds: See Pennsylvania-General, 995.

Kittanning quadrangle: See Pennsylvania-Armstrong and Butler Cos., 893.

Kittatinny limestone: See New Jersey-Hunterdon Co., 843, 995. See also Pennsylvania-Northampton Co., 843.

Kittredge quarry: See Milford, New Hampshire-Hillsboro Co., 715, 716.

Klondike quarry: See Bradford, Rhode Island-Washington Co., 715, 716.

Knox dolomite: See Illinois-Hardin Co., 680.

Knoxdale: See Pennsylvania-Jefferson Co., 748.

Kokadjo: See Maine-Piscataquis Co., 877.

Krewlach's strip mine: See Pennsylvania-Fayette Co., 893.

Krolick Coal Co. drift mine: See Pennsylvania-Clearfield Co., 893.

Krolick Coal Co. strip mine: See Pennsylvania-Clearfield Co., 893.

Krubsach, Wedig, well (Embarrass): See Wisconsin-Waupaca Co., 796.

Kulpmont: See Pennsylvania-Northumberland Co., 1011.

L

Lacasse quarry: See Vermont-Orleans Co., 716.

Lafferty Coal Co. strip mine: See Ohio-Belmont Co., 966.

Lake: See Vermont-Essex Co., 842.

Lake Bonair: See Connecticut-Tolland Co., 706.

Lake Champlain: See New York-Essex Co., 843, 879, 880.

Lake Champlain Iron District: See New York-General, 1034.

Lake George: See New York-Warren Co., 875.

Lake Luzerne: See New York-Warren Co. but see also New York-Saratoga Co., 875.

Lake Memphremagog: See Vermont-Orleans Co., 717.

Lake Mendota: See Wisconsin-Dane Co., 796.

Lake Placid: See New York-Essex Co., 875.

Lake Saltonstall: See Connecticut-New Haven Co., 1035.

Lake Sanford mines: See New York-Essex Co., 843.

Lake Wausau quarry: See Wisconsin-Marathon Co., 744.

Lakeview tonalite: California-General but see also Massachusetts-Middlesex Co., 804.

Lambert's prospect on Myron Goodnough farm: See Cabot, Vermont-Washington Co., 716, 717.

Lambertville: See New Jersey-Hunterdon Co., 1086.

Lambright Coal Co. mine 3.5 mi. W of Bloomfield: See Indiana-Greene Co., 967.

Lancaster: See New Hampshire-Coos Co., 842.

Landenberg: See Pennsylvania-Chester Co., 1018.

Lanesville: See Rockport, Massachusetts-Essex Co., 715, 716.

L'Anse: See Michigan-Baraga Co., 41, 632, 1049, 1051, 1066.

Larrabee quarry: See Windham (township), Connecticut-Windham Co., 716, 718.

Latrobe: See Ohio-Jackson Co., 966.

Latrobe: See Pennsylvania-Westmoreland Co., 893.

Latrobe quadrangle: See Pennsylvania-Westmoreland Co., 893.

Laurel: See Maryland-Prince Georges Co., 777.

Laurel: See Milford, New Hampshire-Hillsboro Co., 715.

Laurelville: See Pennsylvania-Fayette Co., 893.

Lawrence prospects: See New York-Essex Co., 843.

Lebanon: See New Hampshire-Grafton Co., 727.

Lebanon granite: See New Hampshire-Grafton Co., 745.

LeContes Mills: See Pennsylvania-Clearfield Co., 893.

LeContes Mills, Abandoned strip mine near: See Pennsylvania-Clearfield Co., 893.

Ledge Hill roadcut: See New York-Essex Co., 843.

Lehigh Coal and Navigation Company: See Pennsylvania-Carbon Co., 765, 1005, 1076, 1081, 1083, 1084, 1085.

Lehigh Coal and Navigation Co. (exploration work): See Jim Thorpe, Pennsylvania-Carbon Co., 733.

Lehigh Coal and Navigation Co. property: See Pennsylvania-Carbon Co., 817. See also Jim Thorpe, Pennsylvania-Carbon Co., 733, 817, 867, 1059.

Lehigh Mountain: See Pennsylvania-Lehigh Co., 762. See also Pennsylvania-Northampton Co., 766, 975, 1018.

Lehigh River: See Pennsylvania-Carbon Co., 817, 995, 1077. See also Jim Thorpe, Pennsylvania-Carbon Co., 733, 1015.

Lehigh University: See Pennsylvania-Northampton Co., 766.

Lehigh Valley Railroad: See Pennsylvania-Carbon Co., 733, 817, and Jim Thorpe, Pennsylvania-Carbon Co., 733.

Leiper's quarries: See Pennsylvania-Delaware Co., 665, 766, 907, 911, 1018.

Leiper and Lewis quarry: See Pennsylvania-Delaware Co., 665, 911.

Leiperville: See Pennsylvania-Delaware Co., 665, 758, 762, 766, 1018.

Leitch, James E., uranium lease: See Michigan-Dickinson Co., 1048.

Leitch and Isham No. 2 claim: See Michigan-Dickinson Co., 994.

LeMar pit: See New York-Clinton Co., 843.

Lena: See Wisconsin-Oconto Co., 796.

Lenni: See Pennsylvania-Delaware Co., 766, 975, 1018.

Lenni station: See Pennsylvania-Delaware Co., 665.

Leo Cudnoski well (Pound): See Wisconsin-Marinette Co., 796.

Lester J. Lohr strip mine: See Pennsylvania-Somerset Co., 893.

Lewis quadrangle: See Indiana-Vigo Co., 967.

Lewisburg: See Pennsylvania-Union Co., 935.

Lewiston: See Maine-Androscoggin Co., 1039.

Lick Run Coal Co. strip mine: See Pennsylvania-Cambria Co., 893.

Lickdale: See Pennsylvania-Lebanon Co., 935.

Liebergen, Harry, well (DePere): See Wisconsin-Brown Co., 796.

Ligonier well: See Pennsylvania-Westmoreland Co., 816.

Limerick: See Maine-York Co., 877.

Limestone: See Pennsylvania-Clarion Co., 893.

Lincoln Spring: See Saratoga Springs, New York-Saratoga Co., 657.

Lincoln Pond: See New York-Essex Co., 843.

Lincoln Pond mine: See New York-Essex Co., 843.

Lindentree: See Ohio-Carroll Co., 966.

Lindley mine of Pittsburgh Coal Co.: See Pennsylvania-Washington Co., 893.

Linehan quarry: See Massachusetts-Essex Co., 716.

Linton: See Indiana-Greene Co., 967.

Linton quadrangle: See Indiana-Greene Co. but see also Indiana-Sullivan Co., 967.

Lion farm in East Providence: See Rhode Island-Providence Co., 896.

Lipp's brewery site: See Philadelphia, Pennsylvania-Philadelphia Co., 907.

Lipp's brewery site, Quarry SE of: See Philadelphia, Pennsylvania-Philadelphia Co., 907.

Lisbon quadrangle: See Ohio-Columbiana Co., 966.

Litchfield: See Connecticut-Litchfield Co., 950.

Little (or Fellows) mine: See Belvidere group, New Jersey-Warren Co., 843.

Little Ausable River: See New York-Clinton Co., 843.

Little Connoquenessing Creek: See Pennsylvania-Butler Co., 893.

Little Diamond coal: See Pennsylvania-Schuylkill Co., 1011.

Little Egg Inlet: See New Jersey-Atlantic and Ocean Cos., 844.

Little Pond: See New York-Essex Co., 843.

Little Pond mine: See New York-Essex Co., 843.

Little Rapids: See Wisconsin-Brown Co., 796.

Littleton formation: See New Hampshire-Sullivan Co., 695, and Lovewell Mountain quadrangle, New Hampshire-Southwest Part, 772.

Littleton schist: See New Hampshire-Carroll, Coos, Grafton and Hillsboro Cos., 842.

Littleton schists: See New Hampshire-Grafton Co., 694.

Littleton Ridge manganese prospect: See Maine-Aroostook Co., 843.

Livingston: See New Jersey-Essex Co., 786.

Llanerch: See Pennsylvania-Delaware Co., 1018.

Lobachville: See Pennsylvania-Berks Co., 1089.

Lobiskis, John, mine: See West Peru, Maine-Oxford Co., 887.

Lockatong argillite: See New Jersey-General, 1005. See also Pennsylvania-General, 1005.

Lockatong formation: See New Jersey-Hunterdon Co., 995, 996. See also Pennsylvania-Bucks Co., 994, 995, 996.

Lockatong shale: See New Jersey-Hunterdon, Mercer, and Somerset Cos., 973.

Logan: See Philadelphia-Pennsylvania-Philadelphia Co., 766.

Logan quadrangle: See Ohio-Perry Co., 966.

Logan Station: See Philadelphia, Pennsylvania-Philadelphia Co., 665.

Long Lake: See Maine-Cumberland Co., 877.

Long Lake: See New York-Hamilton Co., 875.

Long Mountain granite: See New Hampshire-General, 674.

Longbridge: See Pennsylvania-Westmoreland Co., 816.

Longyear, E. J., Co., drilling program: See Michigan-Baraga Co., 1047.

Loogootee Block Coal Co. mine 2.5 mi. SW of Whitfield: See Indiana-Daviess Co., 967.

Loon Lake: See New York-Warren Co., 711, 712.

Loon Lake depot: See New York-Warren Co., 711.

Loran Day's mine 2 mi. N of Newtonville: See Indiana-Spencer Co., 967.

Lorberry Creek gap: See Pennsylvania-Schuylkill Co., 1011.

Lord Hill: See Maine-Oxford Co., 931.

Lord Hill pegmatite: See Maine-Oxford Co., 1024.

Losee Pond, Byram (township): See New Jersey-Sussex Co., 969.

Louis Manly well (Algoma): See Wisconsin-Door Co., 796.

Love Bros. mine 2.3 mi. N of Brazil: See Indiana-Clay Co., 967.

Lovejoy quarry: See Milford, New Hampshire-Hillsboro Co., 715, 716.

Lovejoy Granite Co.: See Milford, New Hampshire-Hillsboro Co., 715.

Lovell: See Maine-Oxford Co., 877.

Lovewell Mountain quadrangle: See New Hampshire-Southwest Part, 772.

Lower Block coal: See Indiana-Clay Co., 967.

Lower Bloomsburg ferruginous sandstone: See Pennsylvania-Huntingdon Co., 935.

Lower Bloomsburg shales and sandstones: See Pennsylvania-Union Co., 935.

Lower Cambrian slate: See New York-Washington Co., 875.

Lower Clarion coal: See Pennsylvania-General, 995. See also Pennsylvania-Butler Co., 893, Pennsylvania-Clarion Co., 748, 893, and Pennsylvania-Jefferson Co., 748.

Lower Clarion, A' or, coal: See Pennsylvania-Clearfield Co., 748.

Lower Freeport coal: See Pennsylvania-General, 893, 995. See also Pennsylvania-Allegheny and Armstrong Cos., 893. See Pennsylvania-Beaver Co., 748, 994. See Pennsylvania-Butler and Cambria Cos., 893. See Pennsylvania-Clearfield Co., 748, 893. See Pennsylvania-Indiana Co., 893. See Pennsylvania-Jefferson Co., 748. See Pennsylvania-Westmoreland Co., 893.

Lower Freeport, D or, coal: See Pennsylvania-Clearfield Co., 748.

Lower Freeport coal ("D" or Moshanon coal): See Pennsylvania-Clearfield Co., 893.

Lower Freeport No. 6A coal: See Ohio-Jefferson Co., 966.

Lower Freeport Rider coal: See Pennsylvania-Jefferson Co., 748.

Lower Kittanning coal: See Pennsylvania-General, 995. See Pennsylvania-Armstrong Co., 893. See Pennsylvania-Beaver Co., 748. See Pennsylvania-Bedford, Butler, Cambria and Clarion Cos., 893. See Pennsylvania-Clearfield Co., 748.

Lower Kittanning coal (cont.): See Pennsylvania-Fulton and Indiana Cos., 893. See Pennsylvania-Jefferson Co., 994. See Pennsylvania-Lawrence Co., 893.

Lower Kittanning, B or, coal: See Pennsylvania-Clearfield Co., 748.

Lower Kittanning No. 5 coal: See Ohio-Jefferson, Perry, Tuscarawas, and Vinton Co., 966.

Lower Kittanning Rider coal: See Pennsylvania-Cambria Co., 893.

Lower Mercer No. 3 coal: See Ohio-Vinton Co., 966.

Lower Saucon: See Pennsylvania-Northampton Co., 863.

Lower Saucon (township): See Pennsylvania-Northampton Co., 766.

Lower Silurian-Ordovician slate: See New York-Washington Co., 875.

Lowhead Coal Co. drift mine: See Pennsylvania-Indiana Co., 893.

Loysville: See Pennsylvania-Perry Co., 935.

Ludlam Beach Light: See Sea Isle City, New Jersey-Cape May Co., 844.

Luthersburg: See Pennsylvania-Clearfield Co., 748.

Luxor: See Pennsylvania-Westmoreland Co., 893.

Luzerne, Lake: See New York-Warren Co. but see also New York-Saratoga Co., 875.

Lykens: See Pennsylvania-Dauphin Co., 1011.

Lykens quadrangle: See Pennsylvania-Dauphin Co., 1011.

Lykens No. 2 coal: See Pennsylvania-Northumberland Co., 994.

Lykens Valley No. 2 coal: See Pennsylvania-Northumberland Co., 1011.

Lykens Valley No. 4 coal: See Pennsylvania-Schuylkill Co., 1011.

Lykens Valley No. 5 coal: See Pennsylvania-Schuylkill Co., 1011.

Lyme (township): See Connecticut-New London Co., 716, 718, 934, 968.

Lyme granite gneiss: See Lyme (township), Connecticut-New London Co., 716, 718.

Lynn: See Massachusetts-Essex Co., 716.

Lynnfield: See Massachusetts-Essex Co., 716, 787.

Lynnville: See Indiana-Warrick Co., 967.

Lyon Mountain: See New York-Clinton Co., 785, 809, 843.

Lyon Mountain granite: See New York-Clinton Co., 875.

Lyon Mountain granite and gneiss: See New York-Clinton Co., 843.

Lyons Falls: See New York-Lewis Co., 875.

Mc

McCauliff quarry: See Massachusetts-Worcester Co., 778.

McClosky limestone: See Illinois-Jefferson Co., 928, 929.

McCormick Coal Co. drift mine: See Pennsylvania-Cambria Co., 893.

McCrea's quarry: See Philadelphia, Pennsylvania-Philadelphia Co., 766.

McCutcheon Creek: See Michigan-Iron Co., 996.

McDonald: See Pennsylvania-Washington Co., 971.

McDonald quarry: See Bedford, New York-Westchester Co., 846.

McGaughey quarry: See Groton (township), Connecticut-New London Co., 716, 718.

McIntyre Coal Co. drift mine: See Pennsylvania-Bedford Co., 893.

McKeever: See New York-Herkimer Co., 875.

McKnight's Gap: See Pennsylvania-Berks Co., 766.

McLeansboro formation, coal beds: See Illinois-General, 894.

McLear pegmatite: See New York-St. Lawrence Co., 942, 947.

M

M. D. Hoyman's strip mine: See Pennsylvania-Westmoreland Co., 893.

M. & E. Coal Co. strip mine on Allegheny River: See Pennsylvania-Armstrong Co., 893.

M. & E. Coal Co. strip mine on Pa. Highway 5: See Pennsylvania-Armstrong Co., 893.

Macksburg quadrangle: See Ohio-Monroe Co., 966.

Madison: See Conway, New Hampshire-Carroll Co., 715, 716.

Madison: See Wisconsin-Dane Co., 796.

Magnolia Ave., Wildwood: See New Jersey-Cape May Co., 844.

Maguire quarry: See Hopkinton, Massachusetts-Middlesex Co., 715.

Maguire and O'Heron quarry: See Milton, Massachusetts-Norfolk Co., 715.

Mahoning coal: See Pennsylvania-Bedford and Westmoreland Cos., 893.

Main syenite stock: See Vermont-Windsor Co., 719.

Maine and New Hampshire Granite Corp.: See Conway, New Hampshire-Carroll Co., 715.

Maine Feldspar Company: See Auburn, Maine-Androscoggin Co., 984.

Maine Highway 3: See Maine-Hancock Co., 877.

Maine Highway 5: See Maine-Oxford Co., 877.

Maine Highway 11: See Maine-Aroostook Co., 843. See also Maine-Cumberland and York Cos., 877.

Maine Highway 15: See Maine-Piscataquis Co., 877.

Maine Highway 16: See Maine-Oxford Co., 877.

Maine Highway 17: See Maine-Franklin and Oxford Cos., 877.

Maine Highway 26: See Maine-Androscoggin and Oxford Cos., 877.

Maine Highway 35: See Maine-Cumberland and Oxford Cos., 877.

Maine Highway 37: See Maine-Oxford Co., 877.

Maine Highway 107: See Maine-Oxford Co., 877.

Maine Highway 109: See Maine-York Co., 877.

Maine Highway 110: See Maine-York Co., 877.

Maine Highway 113: See Maine-Oxford Co., 877.

Maine Highway 114: See Maine-Cumberland Co., 877.

Maine Highway 117: See Maine-Oxford Co., 877.

Maine Highway 118: See Maine-Oxford Co., 877.

Maine Highway 119: See Maine-Oxford Co., 877.

Maine Highway 120: See Maine-Oxford Co., 877.

Maine Highway 121: See Maine-Cumberland Co., 877.

Maine Highway 153: See Maine-York Co., 877.

Maine Highway 160: See Maine-Oxford Co., 877.

Maine Highway 182: See Maine-Washington Co., 877.

Maine Highway 198: See Maine-Hancock Co., 877.

Maine Highway 302: See Maine-Cumberland and Oxford Cos., 877.

Mallick Coal Co. strip mine: See Ohio-Tuscarawas Co., 966.

Mamacoke gneiss: See Stonington (township), Connecticut-New London Co., 716, 718. See also Waterford (township), Connecticut-New London Co., 718.

Mamaroneck Ave. near Hutchinson River Parkway, White Plains: See New York-Westchester Co., 1070.

Mammoth coal: See Pennsylvania-Dauphin, Luzerne, Northumberland, and Schuylkill Cos., 1011.

Manayunk schists: See Philadelphia, Pennsylvania-Philadelphia Co., 665.

Manchester: See New Hampshire-Hillsboro Co., 716, 859.

Manhattan Island, New YorkCity: See New York-New York Co., 640, 652, 693, 768, 775, 784, 839, 845, 884, 1021.

Manhattan schist: See New York-Westchester Co., 843.

Manly, Louis, well (Algoma): See Wisconsin-Door Co., 796.

Mansfield-Lower Pennsylvanian sandstone: See Indiana-Gibson Co., 928, 929.

Maple Grove Coal Co. 7 mi. SE of Rockville: See Indiana-Parke Co., 967.

Maplewood shale member of Clinton formation: See New York-Monroe Co., 935.

Marble Mountain: See New Jersey-Warren Co., 843, 994.

Marblehead Neck: See Massachusetts-Essex Co., 1008.

Marcellus ore sandstone: See Pennsylvania-Huntingdon Co., 935.

Marcus Hook Creek: See Pennsylvania-Delaware Co., 766.

Marcy anorthosite: See New York-Essex Co., 843.

Mariah Collieries Corp. mine 1 mi. W of Coal City: See Indiana-Clay Co., 967.

Marinette: See Wisconsin-Marinette Co., 796.

Marinette Paper Mills well: See Wisconsin-Marinette Co., 796.

Marion quadrangle: See Illinois-Williamson Co., 894.

Marion Coal Co. drift mine: See Pennsylvania-Cambria Co., 893.

Marion Heights: See Pennsylvania-Northumberland Co., 1011.

Marlton roadcut: See New Jersey-Burlington Co., 843.

Maromas granite gneiss: See Middletown, Connecticut-Middlesex Co., 716, 718.

Marple: See Pennsylvania-Delaware Co., 665.

Marquette District: See Michigan-Marquette Co., 805.

Marquette Range: See Michigan-Upper Peninsula, 1066.

Marriott quarry: See Sterling, Connecticut-Windham Co., 718.

Marshwood Reservoir Dam: See Pennsylvania-Lackawanna Co., 1011.

Martin & Lewis Coal Co. drift mine: See Pennsylvania-Westmoreland Co., 893.

Mascoma dome: See New Hampshire-Grafton Co., 697.

Mashapaug Pond: See Connecticut-Tolland Co. but see also Massachusetts-Worcester Co., 793.

Masons Island: See Stonington (township), Connecticut-New London Co., 716, 718.

Masons Island quarry: See Stonington (township), Connecticut-New London Co., 716, 718.

Masontown: See Pennsylvania-Fayette Co., 893.

Masontown quadrangle: See Pennsylvania-Fayette Co., 893.

Massachusetts Pink Granite Co.: See Hopkinton, Massachusetts-Middlesex Co., 715. See also Milford, Massachusetts-Worcester Co., 715.

Massachusetts Pink quarry: See Milford, Massachusetts-Worcester Co., 715.

Massachusetts and Connecticut Highway 15: See Massachusetts-Worcester Co. but see also Connecticut-Tolland Co., 793.

Mauch Chunk: See Jim Thorpe, Pennsylvania-Carbon Co., 7, 20, 78, 82, 444, 509, 635, 733, 762, 765, 766, 817, 841, 867, 874, 883, 917, 995, 1005,

Mauch Chunk (cont.): See Jim Thorpe, Pennsylvania-Carbon Co., 1015, 1016, 1017, 1018, 1042, 1059, 1075, 1076, 1077, 1078, 1081, 1083, 1084, 1085, 1087.

Mauch Chunk formation: See Pennsylvania-Schuylkill Co., 1011.

Mauch Chunk ridge: See Jim Thorpe, Pennsylvania-Carbon Co., 733, 817, 867.

Mauch Chunk shale: See Pennsylvania-Carbon Co. and Jim Thorpe, Pennsylvania-Carbon Co., 733.

Maumee Collieries Co. mine 2.5 mi. SE of Jasonville: See Indiana-Greene Co., 967.

Maumee Collieries Co. mine 3.7 mi. SW of Linton: See Indiana-Greene Co., 967.

Maumee Collieries Co. mine 1.5 mi. SE of Coal City: See Indiana-Owen Co., 967.

Maumee Collieries Co. mine 1 mi. SW of Dugger: See Indiana-Sullivan Co., 967.

Maumee Collieries Co. mine 9 mi. SE of Terre Haute: See Indiana-Vigo Co., 967.

Mays Coal Co. strip mine S of Limestone: See Pennsylvania-Clarion Co., 893.

Mechanic Falls: See Maine-Androscoggin Co. but see also Maine-Oxford Co., 877.

Medford: See New Jersey-Burlington Co., 843.

Media: See Pennsylvania-Delaware Co., 1018.

Medway: See New York-Greene Co., 875.

Meigs Creek No. 9 coal: See Ohio-Belmont Co., 966.

Melrose quarry: See Stoneham, Maine-Oxford Co., 887.

Memphremagog, Lake: See Vermont-Orleans Co., 717.

Mendota, Lake: See Wisconsin-Dane Co., 796.

Mercer coal: See Pennsylvania-Clearfield and Jefferson Cos. 748, and Fayette and Westmoreland Cos., 893.

Mercer No. 3 coal: See Ohio-Columbiana Co., 966.

Mercer quadrangle: See Pennsylvania-Lawrence Co., 893.

Meredith granite: See New Hampshire-General, 674.

Mermaid quarry: See Philadelphia-Pennsylvania-Philadelphia Co., 665.

Mermaid station: See Philadelphia, Pennsylvania-Philadelphia Co., 1018.

Merryall: See Connecticut-Litchfield Co., 1058

Mesnard epidote: See Michigan-Houghton Co., 991, 992.

Miami River: See Ohio-Hamilton Co., 1057.

Mica, Mount: See Paris, Maine-Oxford Co., 655, 962.

Michigamme (township): See Michigan-Marquette Co., 970.

Michigamme slate: See Michigan-Baraga Co., 994.

Michigan City: See Indiana-La Porte Co., 11.

Michigan Department of Conservation: See Michigan-Dickinson Co., 1067.

Middle Falls: See New York-Washington Co., 875.

Middle Granville: See New York-Washington Co., 875.

Middle Haddam: See Connecticut-Middlesex Co., 968.

Middle Inlet: See Wisconsin-Marinette Co., 796.

Middle Kittanning coal: See Ohio-Carroll Co., 994.

Middle Kittanning coal: See Pennsylvania-General 995. See Pennsylvania-Armstrong Co., 893. See Pennsylvania-Beaver Co., 748. See Pennsylvania-Butler and Cambria Cos., 893. See Pennsylvania-Jefferson Co., 748.

Middle Kittanning, C or, coal: See Pennsylvania-Clearfield Co., 748.

Middle Kittanning No. 6 coal: See Ohio-Carroll, Columbiana, Coshocton, Harrison, Muskingum, Perry, Tuscarawas, and Vinton Cos., 966.

Middletown: See Connecticut-Middlesex Co., 7, 662, 690, 709, 716, 718, 720, 721, 753, 754, 758, 774, 794, 827, 839, 913, 914, 916, 934, 949, 950, 955, 968, 977, 1035, 1053.

Middletown, China-stone quarry near: See Connecticut-Middlesex Co., 949, 955.

Middletown, Feldspar quarry 3 mi. from: See Connecticut-Middlesex Co., 794.

Middletown gneiss: See Connecticut-Middlesex Co., 774. See also Connecticut-New Haven Co., 842.

Middletown series: See Connecticut-Middlesex Co., 753.

Middletown (township): See Pennsylvania-Delaware Co., 665, 766, 911, 1018.

Midland: See Pennsylvania-Beaver Co., 748.

Mid-Paleozoic pegmatites: See United States-Northeast Part, 642.

Midvale Coal Co. diamond drill-hole core: See Ohio-Tuscarawas Co., 966.

Midwest Radiant Corp. strip mine: See Illinois-St. Clair Co., 894.

Mikado mine at Wakefield: See Michigan-Gogebic Co., 745.

Milbury: See Massachusetts-Worcester Co., 793.

Milesburg: See Pennsylvania-Centre Co., 935.

Milford: See Massachusetts-Worcester Co., 715, 716, 745, 898, 899, but see also Massachusetts-Middlesex Co., 715.

Milford: See New Hampshire-Hillsboro Co., 715, 716, 859.

Milford granite: See Massachusetts-Worcester Co., 716. See also New Hampshire-Hillsboro Co., 716.

Milford pink granite: See Massachusetts-Worcester Co., 716.

Milford Stone Co.: See Milford, Massachusetts-Worcester Co., 715.

Mill Center: See Wisconsin-Brown Co., 796.

Mill Street quarry: See Philadelphia, Pennsylvania-Philadelphia Co., 665.

Millstadt: See Illinois-St. Clair Co., 894.

Millstone granite: See Waterford (township), Connecticut-New London Co., 716, 718.

Millstone quarry: See Millstone Point quarry, Waterford (township), Connecticut-New London Co., 716, 718.

Millstone Hill: See Barre, Vermont-Washington Co., 716, 717.

Millstone Point: See Waterford (township), Connecticut-New London Co., 716, 718, 754.

Millstone Point (or Millstone) quarry: See Waterford (township), Connecticut-New London Co., 716, 718, 754.

Milton: See Massachusetts-Norfolk Co., 715, 716, 793.

Milton: See Vermont-Chittenden Co., 842.

Milton dolomite: See Vermont-General, 443, and Vermont-Chittenden Co., 841, 842.

Milton Mills: See Maine-York Co., 877.

Mine Hill: See New Jersey-Sussex Co., 700, 922.

Mine Hill: See Pennsylvania-Bucks Co., 843.

Mine Hill mine: See Franklin, New Jersey-Sussex Co., 846.

Mine Mountain: See New York-Putnam Co., 996.

Mine Run Gap: See Pennsylvania-Lebanon Co., 1011.

Mineral Hill: See Pennsylvania-Delaware Co., 766, 1018.

Mineville: See New York-Essex Co., 78, 82, 633, 811, 843, 850, 851, 875, 994, 995.

Mineville District: See New York-Essex Co., 843.

Mineville group of ore beds: See New York-Essex Co., 843.

Minorcus Hill: See Pennsylvania-Chester Co., 927, 975.

Minot: See Maine-Androscoggin Co., 877.

Minshall coal: See Indiana-Southwest Part and Fountain Co., 967. See also Indiana-Spencer Co., 967, 996.

Mishler: See Pennsylvania-Somerset Co., 893.

Mississippi River: See Wisconsin-General, 630.

Mississippi River sand: See Illinois-Henderson Co., 823.

Mississippian limestone: See Illinois-Hardin Co., 796.

Mitchell mine: See New Jersey-Warren Co., 843.

Mitchell prospect: See New York-Clinton Co., 843.

Moat Brook: See Conway, New Hampshire-Carroll Co., 715. See also White Mountains Alkaline Batholith-New Hampshire-Carroll Co., 673.

Moat Mountain: See White Mountains Alkaline Batholith, New Hampshire-Carroll Co., 673.

Mohatin Hills: See Michigan-Baraga Co., 840.

Mohatin Hills mine: See Michigan-Baraga Co., 840.

Mohawk fissure, Ahmeek mine: See Michigan-Keweenaw Co., 991.

Mohawk mine: See Michigan-Keweenaw Co., 992.

Molino: See Pennsylvania-Schuylkill Co., 935.

Monadnock, Mount: See Vermont-Essex Co., 698, 1023.

Monongahela River: See Pennsylvania-Fayette Co., 893.

Monongahela series: See Ohio-General-966. See also Pennsylvania-General, 893, 995.

Monroe (township): See Connecticut-Fairfield Co., 934, 968.

Monroe: See New York-Orange Co., 662, 810, 846, 950.

Monroe dolomite: See Michigan-Osceola Co., 928, 929.

Monson: See Maine-Piscataquis Co., 877.

Monson: See Massachusetts-Hampden Co., 716, 739.

Monson granodiorite: See Connecticut-Middlesex Co., 755. See also Massachusetts-Hampden Co., 716, 739.

Montalban schist: See New Hampshire-Grafton Co., 668.

Montgomery: See Pennsylvania-Lycoming Co., 935.

Moose Mountain: See New Hampshire-Grafton Co., 697.

Moose River: See New York-Lewis Co., 875.

Morgan: See Pennsylvania-Delaware Co., 766, 1018.

Morgan station: See Pennsylvania-Delaware Co., 665.

Morgan station, Quarry below: See Pennsylvania-Delaware Co., 771.

Morgan Coal Co. mine 2.7 mi. NE of Kingman: See Indiana-Fountain Co., 967.

Morgan Hill: See Pennsylvania-Northampton Co., 843.

Morgan Hill mines: See Pennsylvania-Northampton Co., 843.

Morgan Mines, Inc., two strip mines: See Illinois-Williamson Co., 894.

Moriah: See New York-Essex Co., 734, 950, 1021.

Moriah Center: See New York-Essex Co., 875.

Morning Sun: See Ohio-Preble Co., 903.

Morrison quarry: See Ryegate, Vermont-Caledonia Co., 717.

Morton: See Pennsylvania-Delaware Co., 665, 766, 883, 975, 1018.

Moulton diorite: See New Hampshire-General, 674.

Mount Adam: See New York-Orange Co., 710, 810, 921.

Mount Airy: See Philadelphia, Pennsylvania-Philadelphia Co., 665, 766, 862, 1018.

Mount Apatite: See Auburn, Maine-Androscoggin Co., 655, 962, 984.

Mount Ascutney: See Vermont-Windsor Co., 716, 717, 719, 790.

Mount Carmel: See Pennsylvania-Northumberland Co., 994, 1011.

Mount Carmel quadrangle: See Pennsylvania-Northumberland Co., 1011.

Mount Clough pluton: See New Hampshire-Grafton Co., 696, 774.

Mount Defiance: See New York-Essex Co., 880.

Mount Desert Island: See Maine-Hancock Co., 692, 877.

Mount Eve: See New York-Orange Co., 810, 921.

Mount Freedom: See New Jersey-Morris Co., 691, 846, 997.

Mount Greylock: See Massachusetts-Berkshire Co., 793.

Mount Holly: See New Jersey-Burlington Co., 843.

Mount Hope mine: See New Jersey-Morris Co., 843.

Mount Joy: See Pennsylvania-Westmoreland Co., 893.

Mount Lafayette type granite porphyry: See New Hampshire-General-674.

Mount Mica: See Maine-Oxford Co., 655, 962.

Mount Mica mine: See Rumford, Maine-Oxford Co., 795, 887.

Mount Monadnock: See Vermont-Essex Co., 698, 1023.

Mount Olive: See New Jersey-Morris Co., 691, 708, 846, 997.

Mount Olive mines: See New Jersey-Morris Co., 691.

Mount Osceola type hastingsite granite and soda-hornblende granite: See New Hampshire-General, 674.

Mount Pisgah: See Jim Thorpe, Pennsylvania-Carbon Co., 7, 78, 82, 635, 733, 766, 817, 867, 874, 1005, 1016, 1017.

Mount Pleasant quarry: See Milton, Massachusetts-Norfolk Co., 715, 716.

Mount Prospect complex: See Connecticut-Litchfield Co., 689.

Mount Stanton: See White Mountains Alkaline Batholith, New Hampshire-Carroll Co., 673.

Mount Union: See Pennsylvania-Huntingdon Co., 935.

Mountain: See Wisconsin-Oconto Co., 796.

Mountain Glen black shale: See Illinois-General, 841.

Mountain Glen shale: See Illinois-Union Co., 928, 929.

Mountain Pond: See White Mountains Alkaline Batholith, New Hampshire-Carroll Co., 673.

Mountain View: See New Jersey-Passaic Co., 786.

Mower quarry: See Windsor, Vermont-Windsor Co., 716, 717.

Mud Mine: See New Jersey-Sussex Co., 808, 810.

Mulligan quarry: See New Jersey-Hunterdon Co., 843, 994.

Mulzer mines, abandoned mine 3.7 mi. SE of Gentryville: See Indiana-Spencer Co., 967.

Mulzer mines, mine 4.3 mi. NE of Chrisney: See Indiana-Spencer Co., 967.

Murphy Coal Co. strip mine: See Pennsylvania-Indiana and Westmoreland Cos., 893.

Murphysboro quadrangle: See Illinois-Jackson Co., 894.

Murray quarry: See Stonington (township), Connecticut-New London Co., 716, 718.

Murray Hill: See New Jersey-Union Co., 745, 786.

Murrinsville: See Pennsylvania-Butler Co., 893.

Murrinsville-Cherry Valley road: See Pennsylvania-Butler Co., 893.

Myron Goodnough farm: See Cabot, Vermont-Washington Co., 717.

Mystic: See Groton (township), Connecticut-New London Co., 716, 718.

Mystic granite: See Groton (township), Connecticut-New London Co., 716.

N

Naaman's Creek: See Pennsylvania-Delaware Co., 766.

Nanticoke: See Pennsylvania-Luzerne Co., 1011.

Nanticoke quadrangle: See Pennsylvania-Luzerne Co., 1011.

Nanty Glo: See Pennsylvania-Cambria Co., 893.

Naples: See Maine-Cumberland Co., 877.

Naples: See New York-Yates Co., 868.

Narragansett: See Rhode Island-Washington Co., 751.

Narragansett Pier: See Rhode Island-Washington Co., 726.

National Lead Company (laboratory): See Massachusetts-Middlesex Co., 1082.

National Lead Company mines: See New York-Essex Co., 843.

Natural Bridge: New York-Jefferson Co. but see New York-Lewis Co., 875.

Navarre quadrangle: See Ohio-Tuscarawas Co., 966.

Negaunee (township): See Michigan-Marquette Co., 970.

Neighbors mine: See New Jersey-Hunterdon Co., 843.

Nesquehoning: See Pennsylvania-Carbon Co., 1011.

Nesquehoning quadrangle: See Pennsylvania-Carbon Co., 1011.

Netcong: See New Jersey-Morris Co., 843.

Nevel mine: See Newry, Maine-Oxford Co., 858, 962, 984, 1053.

Nevin's quarry SW of Landenberg: See Pennsylvania-Chester Co., 1018.

New Albany shale: See Illinois-Hardin Co., 680. See also Indiana-General, 443, 841.

New Alexandria: See Pennsylvania-Westmoreland Co., 893, 1054.

New Anguilla quarry: See Connecticut-New London Co., 716.

New Athens quadrangle: See Illinois-St. Clair Co., 894.

New Bethlehem: See Pennsylvania-Armstrong Co., 893.

New Braintree: See Massachusetts-Worcester Co., 793.

New County Line coal: See Pennsylvania-Lackawanna Co., 1011.

New England quarry: See Westerly, Rhode Island-Washington Co., 715, 716.

New England Granite Works: See Westerly, Rhode Island-Washington Co., 715.

New Florence quadrangle: See Pennsylvania-Indiana and Westmoreland Cos., 893.

New Hampshire magma series: See New Hampshire-General, 674, 996.

New Hampshire Highway 9: See New Hampshire-Cheshire Co., 842.

New Hampshire Highway 10: See New Hampshire-Cheshire Co., 842.

New Hampshire Highway 11: See New Hampshire-Belknap Co., 842.

New Hampshire Highway 11A: See New Hampshire-Belknap Co., 842.

New Hampshire Highway 16: See New Hampshire-Carroll and Coos Cos., 842.

New Hampshire Highway 25: See New Hampshire-Grafton Co., 842.

New Hampshire Highway 26: See New Hampshire-Coos Co., 842.

New Hampshire Highway 31: See New Hampshire-Hillsboro Co., 842.

New Hampshire Highway 101: See New Hampshire-Hillsboro Co., 842.

New Hampshire Highway 103: See New Hampshire-Merrimack Co., 842.

New Hampshire Highway 110: New Hampshire-Coos Co. but see New Hampshire-Carroll and Coos Cos., 842.

New Hampshire Mica and Mining Co. quarry: See Alstead, New Hampshire-Cheshire Co., 856, 857, 859.

New Haven: See Connecticut-New Haven Co., 684, 685, 686, 868, 933.

New Jersey Highway 5: See New Jersey-Bergen Co., 745.

New Jersey Highway 30: See New Jersey-Hunterdon Co., 973.

New Jersey Reformatory land: See New Jersey-Hunterdon Co., 843.

New Kensington quadrangle: See Pennsylvania-Allegheny Co., 893.

New London: See Connecticut-New London Co., 716, 718, 754.

New Milford: See Connecticut-Litchfield Co., 685, 737, 934, 1035, 1058.

New Orient mine: See West Frankfort, Illinois-Franklin Co., 928, 929.

New Orient mine, No. 2: See West Frankfort, Illinois-Franklin Co., 928, 929.

New Philadelphia: See Ohio-Tuscarawas Co., 966.

New Pit, Nevel Mine: See Newry, Maine-Oxford Co., 1053.

New Red Spring: See Saratoga Springs, New York-Saratoga Co., 625, 869.

New Shonts well: See Saratoga Springs, New York-Saratoga Co., 625, 869.

New Shoreham: See Rhode Island-Newport Co., 751.

New Stanton: See Pennsylvania-Westmoreland Co., 893.

New Stanton Coal Co. drift mine: See Pennsylvania-Westmoreland Co., 893.

"New Westerly blue" granite: See Milford, New Hampshire-Hillsboro Co., 715.

"New Westerly" granite: See Milford, New Hampshire-Hillsboro Co., 716.

New Westerly quarry: See Milford, New Hampshire-Hillsboro Co., 715, 716.

New Westerly Granite Co.: See Milford, New Hampshire-Hillsboro Co., 715.

New York City (General, including all five boroughs: Bronx, Brooklyn, Manhattan, Queens, and Richmond): See New York-Bronx-Kings-New York-Queens-Richmond Cos., 768, 846. (See also New York-New York Co. for information on Manhattan Island and New York-Richmond Co. for information on Staten Island)

New York City (Manhattan Island): See New York-New York Co., 640, 652, 693, 768, 775, 784, 839, 845, 884, 1021.

New York City (Staten Island): See New York-Richmond Co., 745, 786.

New York Highway 3: See New York-St. Lawrence Co., 843, and New York-Franklin, Lewis and St. Lawrence Cos., 875.

New York Highway 3/365: See New York-Clinton Co., 875.

New York Highway 8: See New York-Essex, Hamilton, Herkimer, and Warren Cos., 875.

New York Highway 9K: See New York-Warren Co., 875.

New York Highway 9L: See New York-Warren Co., 875.

New York Highway 9N: See New York-Essex and Warren Cos., 875.

New York Highway 10: See New York-Franklin, Fulton, and Hamilton Cos., 875.

New York Highway 11: See New York-Jefferson Co., 875.

New York Highway 11B: See New York-St. Lawrence Co., 875.

New York Highway 22: See New York-Clinton, Dutchess and Essex Cos., 875.

New York Highway (22A) 286: See New York-Washington Co., 875.

New York Highway 26: See New York-Jefferson Co., 875.

New York Highway 26W: See New York-Jefferson Co., 875.

New York Highway 28: See New York-Hamilton, Herkimer, Lewis, and Oneida Cos., 875.

New York Highway 28N: See New York-Hamilton Co., 875.

New York Highway 29A: See New York-Fulton Co., 875.

New York Highway 30: See New York-Hamilton Co., 875.

New York Highway 32: See New York-Orange and Ulster Cos., 875.

New York Highway 40: See New York-Washington Co. 875.

New York Highway 44: See New York-Dutchess Co., 875.

New York Highway 52: See New York-Orange and Ulster Cos., 875.

New York Highway 55: See New York-Dutchess Co., 875.

New York Highway 56: See New York-St. Lawrence Co., 875.

New York Highway 58: See New York-St. Lawrence Co., 875.

New York Highway 72: See New York-Franklin Co., 875.

New York Highway 73: See New York-Essex Co., 875.

New York Highway 82: See New York-Dutchess Co., 875.

New York Highways 86 and 86A: See New York-Essex Co., 875.

New York Highway 87: See New York-St. Lawrence Co., 875.

New York Highway 94: See New York-Orange Co., 875.

New York Highway 149: See New York-Washington Co., 875.

New York Highway 154: See New York-Rensselaer Co., 875.

New York Highway 185: See New York-St. Lawrence Co., 875.

New York Highway 199: See New York-Dutchess Co., 875.

New York Highway 203: See New York-Columbia Co., 875.

New York Highway 217: See New York-Columbia Co., 875.

New York Highway 286 (22A): See New York-Washington Co., 875.

New York Highway 301: See New York-Putnam Co., 842.

New York Highway 343: See New York-Dutchess CO., 875.

New York Highway 347: See New York-Essex Co., 875.

New York Highway 365: See New York-Franklin and Hamilton Cos., 875.

New York Highway 374: See New York-Clinton Co., 875.

New York Highway 418: See New York-Warren Co., 875.

New York Highway 423: See New York-Saratoga Co., 875.

New York-Pennsylvania Highlands: See Jim Thorpe, Pennsylvania-Carbon Co., 1016.

Newall, Joseph, & Co.: See Bradford, Rhode Island-Washington Co., 715.

Newall quarry: See Bradford, Rhode Island-Washington Co., 715, 716.

Newark: See Vermont-Caledonia Co., 716, 717.

Newark pink granite: See Vermont-Caledonia Co., 716, 717.

Newburg quadrangle: See Indiana-Warrick Co., 967.

Newburgh: See New York-Orange Co., 875.

Newcastle quadrangle: See Pennsylvania-Beaver Co., 748.

Newcomb quadrangle: See New York-Essex and Hamilton Cos., 644.

Newlin (township): See Pennsylvania-Chester Co., 665, 766, 975.

Newport: See Indiana-Vermillion Co., 967.

Newport: See New Hampshire-Sullivan Co., 937.

Newport: See Vermont-Orleans Co., 716, 717.

Newport Granite Company quarry: See Derby, Vermont-Orleans Co., 717, 854.

Newry: See Maine-Oxford Co., 655, 690, 756, 783, 858, 887, 945, 962, 984, 998, 1053, 1070.

Newry mine: See Newry, Maine-Oxford Co., 690, 887, 998.

Newry, Quarry at: See Maine-Oxford Co., 783.

Newton: See New Jersey-Sussex Co., 935.

Newton Falls: See New York-St. Lawrence Co., 875.

Newtonville: See Indiana-Spencer Co., 967.

Niagara Falls: See New York-Niagara Co., 935.

Niagara Gorge: See New York-Niagara Co., 935.

Niantic: See Bradford, Rhode Island-Washington Co., 715.

Nickerson quarries: See Rockport, Massachusetts-Essex Co., 715.

Nicktown: See Pennsylvania-Cambria Co., 893.

No. 2 coal: See Illinois-General and Illinois-Bureau Co., 928, 929.

No. 5 coal bed: See Illinois-General-996.

No. V coal: See Indiana-Greene and Warrick Cos., 996.

No. 6 coal: See Illinois-General, 996. See also West Frankfort, Illinois-Franklin Co., 928, 929. See also Pennsylvania-Schuylkill Co., 994, 1011.

No. 9½ (?) coal: See Pennsylvania-Schuylkill Co., 1011.

Nonesuch shale: See Michigan-Upper Peninsula, 443.

Norcross quarry: See Milford, Massachusetts-Worcester Co., 715.

Norcross quarry: See Windsor, Vermont-Windsor Co., 716, 717.

Norcross Milford Pink Granite Co.: See Hopkinton, Massachusetts-Middlesex Co., 715.

Norfolk: See Norfolk (township), Connecticut-Litchfield Co., 968.

Norfolk (township): See Connecticut-Litchfield Co., 716, 718, 968.

Normanskill grit: See New York-Washington Co., 875.

Norris Coal Co. slope mine: See Illinois-Williamson Co., 894.

North Adams: See Massachusetts-Berkshire Co., 793.

North Attleboro: See Massachusetts-Bristol Co., 798.

North Bergen: See New Jersey-Hudson Co., 745, 786.

North Bethel: See Maine-Oxford Co., 877.

North Branch Bear Creek: See Pennsylvania-Butler Co., 893.

North Brookfield: See Massachusetts-Worcester Co., 793.

North Cambria Fuel Co. strip mine: See Pennsylvania-Cambria Co., 893.

North Chelmsford: See Massachusetts-Middlesex Co., 745, 803, 804.

North Cliff mine: See Michigan-Keweenaw Co., 991, 992.

North Common Hill: See Massachusetts-Norfolk Co., 1007.

North Concord: See Kirby, Vermont-Caledonia Co., 717.

North Conway: See New Hampshire-Carroll Co., 699, 715, 859.

North Conway quadrangle: See New York-Carroll Co., 673.

North Grafton: See New Hampshire-Grafton Co., 1040.

North Granville: See New York-Washington Co., 875.

North Groton: See New Hampshire-Grafton Co., 668, 1000, 1001.

North Guilford: See Connecticut-New Haven Co., 842.

North Hill: See Westerly, Rhode Island-Washington Co., 739.

North Hillsdale: See New York-Columbia Co., 875.

North Jay: See Maine-Franklin Co., 827, 899.

North Killingworth: See Connecticut-Middlesex Co., 949, 968.

North Lima: See Ohio-Mahoning Co., 966.

North Milford quarry: See Milford, Massachusetts-Worcester Co., 715.

North Milford Granite Co.: See Milford, Massachusetts-Worcester Co., 715.

North Newry: See Maine-Oxford Co., 877.

North Quarry, Bedford: See New York-Westchester Co., 681.

North Sebago: See Maine-Cumberland Co., 877.

North Star Coal Co. strip mine: See Pennsylvania-Butler Co., 893.

North Woodstock: See New Hampshire-Grafton Co., 842.

Northampton: See Massachusetts-Hampshire Co., 641.

Northern Field (a coal field): See Pennsylvania-General and Pennsylvania-Lackawanna and Luzerne Cos., 1011.

Northern Paper Mills well (Green Bay): See Wisconsin-Brown Co., 796.

Northville: See New York-Fulton Co. but see also New York-Hamilton and Saratoga Cos., 875.

Northwest Hill: See Williamstown, Massachusetts-Berkshire Co., 959.

Norton mine: See Vermont-Essex Co., 1023.

Norway: See Maine-Oxford Co., 858, 877.

Norway Lake: See Maine-Oxford Co., 877.

Norwich: See Connecticut-New London Co., 78, 82, 662, 934, 950, 953, 956, 960, 968.

Norwich: See Massachusetts-Hampshire Co., 821.

Noyes Mountain: See Greenwood, Maine-Oxford Co., 690, 887.

Nubble mica mine: See Greenwood, Maine-Oxford Co., 887.

O

Oak Hill quadrangle: See Ohio-Lawrence Co., 966.

Oakland City: See Indiana-Gibson Co., 967.

Ocean City: See Maryland-Worcester Co., 11.

Ochee Spring: See Rhode Island-Providence Co., 896.

Oconto: See Wisconsin-Oconto Co., 796.

Oconto Falls: See Wisconsin-Oconto Co., 796.

Oconto River: See Wisconsin-Oconto Co., 796.

Octararo Creek: See Pennsylvania-Lancaster Co., 216, 724.

O'Fallon quadrangle: See Illinois-St. Clair Co., 894.

Ogden mine: See New Jersey-Sussex Co., 691, 997.

Ogden mines: See New Jersey-Sussex Co., 843.

Ogdensburg: See New Jersey-Sussex Co., 808, 810, 997.

Ogdensburg mine: See Franklin, New Jersey-Sussex Co., 846.

Ohio black shale: See Indiana-General, 883.

Ohio Highway 7: See Ohio-Belmont Co., 966.

Ohio Highway 39: See Ohio-Tuscarawas Co., 966.

Ohio Highway 75: See Ohio-Lawrence Co., 966.

Ohio Highway 93: See Ohio-Tuscarawas Co., 966.

Ohio Highway 124: See Ohio-Jackson Co., 966.

Ohio Highway 145: See Ohio-Monroe Co., 966.

Ohio Highway 160: See Ohio-Vinton Co., 966.

Ohio Highway 164: See Ohio-Mahoning Co., 966.

Ohio Highway 165: See Ohio-Mahoning Co., 966.

Ohio Highway 225: See Ohio-Portage Co., 966.

Ohio Highway 271: See Ohio-Coshocton Co., 966.

Ohio Highway 324: See Ohio-Vinton Co., 966.

Ohio Highway 331: See Ohio-Belmont Co., 966.

Ohio Highway 344: See Ohio-Columbiana Co., 966.

Ohio Highway 517: See Ohio-Columbiana Co., 966.

Ohio Highway 555: See Ohio-Muskingum Co., 966.

Ohio River bridge: See Ohio-Jefferson Co., 966.

Ohio River sands: See Illinois-Pulaski Co., 823.

Old Bed: See New York-Essex Co., 811, 843, 994, 995.

Old Colburn furnace: See New York-Essex Co., 843.

Old Forge: See New York-Herkimer Co., 875.

Old Hathorn No. 2 Spring: See Saratoga Springs, New York-Saratoga Co., 657.

Old Iron Mine: See New Jersey-Sussex Co., 789, 808.

Oldstone, the estate of Collin Kemper: See New York-Westchester Co., 1029.

Oldwick: See New Jersey-Hunterdon Co., 745, 798, 800.

Oley Valley: See Pennsylvania-Berks Co., 1089.

Olive, Mount: See New Jersey-Morris Co., 691, 708, 846, 997.

Oliverian magma series: See New Hampshire-General, 674, 996. See also New Hampshire-Cheshire Co., 842, and New Hampshire-Grafton Co., 697.

Oliverian monzonites: See New Hampshire-Carroll and Coos Cos., 842.

Olyphant quadrangle: See Pennsylvania-Lackawanna Co., 1011.

Omega coal: See Illinois-Clay Co., 894.

Oneco: See Connecticut-Windham Co., 716, 718, 934, 968.

Oneco quarry: See Sterling (township), Connecticut-Windham Co., 716, 718.

Onnalinda: See Pennsylvania-Cambria Co., 893.

Onondaga Marcellus black shale: See New York-Orange, Sullivan, and Ulster Cos., 875.

Oquossoc: See Maine-Franklin Co. but see also Maine-Oxford Co., 877.

Orange: See New Hampshire-Grafton Co., 958.

Orange Grove Station: Maryland-Baltimore Co., but see Maryland-Baltimore-Howard Cos., 1063.

Orchard coal: See Pennsylvania-Schuylkill Co., 1011.

Ordovician limestone: See Wisconsin-Brown and Outagamie Cos., 796.

Ordovician rocks: See New York-Columbia Co., 875.

Ordovician sandstone: See Wisconsin-Brown, Calumet, Door, Outagamie Cos., 796.

Ordovician shale: See New York-Columbia and Saratoga Cos., 875.

Ore Bed Point: See New York-Essex Co., 843.

Orenda Spring: See Saratoga Springs, New York-Saratoga Co., 657.

Oreton: See Ohio-Vinton Co., 966.

Orfordville formation: See Vermont-Windham Co., 842.

Oshanter area: See Pennsylvania-Clearfield Co., 748.

Ossipee Mountains: See New Hampshire-Carroll Co., 699, 859.

Oswegatchie: See New York-St. Lawrence Co., 875.

Oswegatchie River: See New York-St. Lawrence Co., 875.

Otis: See Massachusetts-Berkshire Co., 742.

Otisfield: See Maine-Cumberland Co., 877.

Outagamie Asylum deep well (Appleton): See Wisconsin-Outagamie Co., 796.

Owl Creek: See Michigan-Keweenaw Co., 991.

Owlcreek fissure, Copper Falls mine: See Michigan-Keweenaw Co., 992.

Owlcreek riverbed: See Michigan-Keweenaw Co., 992.

Oxbow-Wegatchie road: See New York-Jefferson Co., 875.

Oxford: See Connecticut-New Haven Co., 934, 968.

Oxford: See Maine-Oxford Co., 877.

Oxford: See Ohio-Butler Co., 903.

Oxford furnace: See New Jersey-Warren Co., 843, 876.

Oxford Furnace (village): See New Jersey-Warren Co., 843.

Oxford type Byram gneiss: See New Jersey-Sussex Co., 969.

P

P. H. Kinkel mine and quarries: See Bedford, New York-Westchester Co., 634, 838, 839, 846, 879.

Packanack Mountains: See New Jersey-Passaic Co., 786.

Packer quarry: See Vermont-Caledonia Co., 716.

Paleozoic magma series: See New Hampshire-General, 674.

Paleozoic shales: See Michigan-Osceola Co., 664.

Paleozoic slate-shale belt: See New York-General, 875.

Palermo No. 1 mine (or Palermo mica mine): See Groton, New Hampshire-Grafton Co., 668, 690, 835, 859, 886.

Palermo pegmatite: See New Hampshire-Grafton Co., 70.

Palermo quarry: See New Hampshire-Grafton Co., 1001.

Palisade diabase: See New Jersey-Bergen, Hudson, and Somerset Cos., 745, 786.

Palisade diabase: See New York City, New York-Richmond Co., 745, 786.

Palisades bluff: See New Jersey-Bergen Co., 745.

Palisades sill: See New Jersey-Bergen Co., 688, and New York-Rockland Co., 798.

Palmer area: See Michigan-Marquette Co. 995.

Palmer Hill: See New York-Clinton Co., 633, 809.

Palmer Hill group of mines: See New York-Clinton Co., 843.

Palmerton: See Pennsylvania-Indiana Co., 893.

Parameter quarry: See Derby, Vermont-Orleans Co., 854.

Paris: See Maine-Oxford Co., 655, 795, 858, 887, 962, 1024.

Parker Mountain mica mine: See Center Strafford, New Hampshire-Strafford Co., 690,859,958.

Partridge gneiss: See New Hampshire-Carroll and Coos Cos., 842.

Passumpsic River, East Branch of: See Vermont-Caledonia Co., 716.

Patapsco River, quarries on left bank at Ellicott City: See Maryland-Howard Co., 852.

Patapsco State Park: See Maryland-Baltimore-Howard Cos., 1063.

Paterson: See New Jersey-Passaic Co., 786.

Patterson's farm, Corundum mines on: See Pennsylvania-Chester Co., 665.

Patterson's Mill: See Pennsylvania-Washington Co., 893.

Patton quadrangle: See Pennsylvania-Cambria Co., 893.

Pawcatuck: See Stonington (township), Connecticut-New London Co., 716, 718.

Paxton quartz schist: See Massachusetts-General and Massachusetts-Worcester Co., 793.

Payne Lake granite: See New York-Jefferson Co., 683.

Peabody: See Massachusetts-Essex Co., 716.

"Peabody green" granite: See Massachusetts-Essex Co., 716.

Peabody stock: See Massachusetts-Essex Co., 701.

Peaked Mountain: See White Mountains Alkaline Batholith, New Hampshire-Carroll Co., 673.

Pedro: See Ohio-Lawrence Co., 966.

Peekskill: See New York-Westchester Co., 667, 843, 846, 1005, 1029. See also New York-Orange and Putnam Cos., 843.

Peekskill Creek: See New York-Westchester Co., 843.

Peekskill Hollow Road: See New York-Putnam Co., 1027.

Peerless Spring: See Saratoga Springs, New York-Saratoga Co., 625, 869.

Peet Hill: See Connecticut-Litchfield Co., 934.

Pegmatite Knob: See Michigan-Marquette Co., 805.

Pelham: See Massachusetts-Hampshire Co., 716, 738, 740.

Pelham asbestos quarry: See Massachusetts-Hampshire Co., 738.

Pelham gneiss: See Massachusetts-Hampshire Co., 738.

Pelham granite: See Massachusetts-Hampshire Co., 716.

Pelton's quarry: See Portland, Connecticut-Middlesex Co., 720, 753, 913, 934.

Pen Argyl, 3 mi. NW of: See Pennsylvania-Monroe Co., 935.

Penfield: See Pennsylvania-Clearfield Co., 748.

Penfield quadrangle: See Pennsylvania-Clearfield Co., 748.

Penn Haven Junction: See Pennsylvania-Carbon Co., 733, 817, 995.

Penn Station: See Pennsylvania-Westmoreland Co., 893.

Penn Street quarry: See Philadelphia, Pennsylvania-Philadelphia Co., 665, 766.

Pennsylvania, Commonwealth of, property: See Pennsylvania-Carbon Co., 817.

Pennsylvania Highway 8: See Pennsylvania-Butler Co., 893.

Pennsylvania Highway 22: See Pennsylvania-Cambria Co., 893.

Pennsylvania Highway 28: See Pennsylvania-Jefferson Co., 748.

Pennsylvania Highway 29-209: See Pennsylvania-Carbon Co., 1005.

Pennsylvania Highway 38: See Pennsylvania-Butler Co., 893.

Pennsylvania Highway 45: See Pennsylvania-Carbon Co., 994, and Pennsylvania-Schuylkill Co., 1011.

Pennsylvania Highway 51: See Pennsylvania-Beaver Co., 748.

Pennsylvania Highway 53: See Pennsylvania-Clearfield Co., 748.

Pennsylvania Highway 54: See Pennsylvania-Northumberland Co., 994, 1011.

Pennsylvania Highway 66: See Pennsylvania-Clarion Co., 893.

Pennsylvania Highway 68: See Pennsylvania-Beaver Co., 748.

Pennsylvania Highway 85: See Pennsylvania-Armstrong Co., 893.

Pennsylvania Highway 107: See Pennsylvania-Lackawanna Co., 1011.

Pennsylvania Highway 115: See Pennsylvania-Luzerne Co., 1011.

Pennsylvania Highway 125: See Pennsylvania-Schuylkill Co., 1011.

Pennsylvania Highway 153: See Pennsylvania-Clearfield Co., 748.

Pennsylvania Highway 168: See Pennsylvania-Beaver Co., 748.

Pennsylvania Highway 236: See Pennsylvania-Jefferson Co., 748.

Pennsylvania Highway 294: See Pennsylvania-Luzerne Co., 1011.

Pennsylvania Highway 308: See Pennsylvania-Butler Co., 893.

Pennsylvania Highway 345: See Pennsylvania-Schuylkill Co., 1011.

Pennsylvania Highway 353: See Pennsylvania-Clearfield Co., 748.

Pennsylvania Highway 528: See Pennsylvania-Butler Co., 893.

Pennsylvania Highway 854: See Pennsylvania-Clarion Co., 893.

Pennsylvania Highway 924: See Pennsylvania-Schuylkill Co., 994, 1011.

Pennsylvania Highway 940: See Pennsylvania-Luzerne Co., 1011.

Pennsylvania Highway 951: See Pennsylvania-Clearfield Co., 748.

Pennsylvania 966 bridge: See Pennsylvania-Clarion Co., 893.

Pennsylvania Highway 970: See Pennsylvania-Clearfield Co., 748.

Pennsylvanian black shales: See Illinois-General, 819.

Pennsylvanian cyclotherms: See Illinois-General, 819.

Pennsylvanian system: See Ohio-General, 966. See also Pennsylvania-General, 893, 1011.

Peoples Gas Company deep well: See Pennsylvania-Washington Co., 971.

People's Natural Gas Co. Well No. 1588: See Pennsylvania-Westmoreland Co., 816.

Pequest Furnace: See New Jersey-Warren Co., 843.

Percy quadrangle: See New Hampshire-Carroll Co., 859.

Perry: See Maine-Washington Co., 877.

Perry, W. H., Co.: See New Hampshire-Sullivan Co., 715.

Peru: See Maine-Oxford Co., 858.

Peshtigo: See Wisconsin-Marinette Co., 796.

Peshtigo Paper Mills well: See Wisconsin-Marinette Co., 796.

Pete Weynd's drift mine: See Pennsylvania-Fayette Co., 893.

Peter Green's farm: See Pennsylvania-Delaware Co., 766.

Peterborough: See New Hampshire-Hillsboro Co., 842.

Peters mine: See New Jersey-Passaic Co., 876.

Peters' quarry: See Philadelphia, Pennsylvania-Philadelphia Co., 665, 907.

Petersburg quadrangle: See Indiana-Pike Co. but see also Indiana-Gibson Co., 967.

Peterson Coal Co. strip mine: See Ohio-Portage Co., 966.

Philadelphia: See New York-Jefferson Co., 875.

Philadelphia: See Pennsylvania-Philadelphia Co., 665, 677, 758, 766, 818, 862, 907, 909, 910, 911, 927, 1018.

Philadelphia schists: See Philadelphia, Pennsylvania-Philadelphia Co., 665.

Philadelphia (Frankford) gneiss: See Philadelphia, Pennsylvania-Philadelphia Co., 665.

Philadelphia (Frankford) schists: See Philadelphia, Pennsylvania-Philadelphia Co., 665.

Phillips pyrite mine: See New York-Putnam Co., 841, 995, 996. See New York Putnam Co. but see also New York-Westchester Co., 1005.

Phillipsburg: See New Jersey-Warren Co., 843, 994, 1071, 1072.

Phillipsburg quadrangle: See Pennsylvania-Centre Co., 748.

Philo quadrangle: See Ohio-Muskingum Co., 966.

Phoenix, Camp: See Maine-Piscataquis Co., 877.

Phoenix mine: See Michigan-Keweenaw Co., 991, 992.

Pickering gneiss: See New Jersey-Warren Co., 843.

Pierremont: See New York-St. Lawrence Co., 875.

Pigeon Cove: See Cape Ann, Massachusetts-Essex Co., 793.

Pigeon Hill: See Rockport, Cape Ann, Massachusetts-Essex Co., 715, 716.

Pigeon Hill Granite Co.: See Rockport, Cape Ann, Massachusetts-Essex Co., 715.

Pigeon Hill quarry (sometimes, Lower Pigeon Hill quarry): See Rockport, Cape Ann, Massachusetts-Essex Co., 715, 716,

Pigeon Hill quarry, Upper: See Rockport, Cape Ann, Massachusetts-Essex Co., 715, 745, 802.

Pigeon River: See Wisconsin-Waupaca Co., 796.

Pike (township): See Pennsylvania-Berks Co., 1089.

Pilgrim Coal Co. strip mine: See Pennsylvania-Lawrence Co., 893.

Pinckneyville quadrangle: See Illinois-Perry Co., 894.

Pine Bush: See New York-Orange Co., 875.

Pine Grove: See Pennsylvania-Schuylkill Co., 1011.

Pine Grove quadrangle: See Pennsylvania-Schuylkill Co., 1011.

Pine Hill: See Stonington (township), Connecticut-New London Co., 716, 718.

Pine Hill: See Quincy, Massachusetts-Norfolk Co., 715, 716.

Pine Island: See New York-Orange Co., 710, 1043.

Pine Mountain: See Topsham, Vermont-Orange Co., 717.

Pine Mountain granite: See Topsham, Vermont-Orange Co., 717.

Pine Plains: See New York-Dutchess Co., 875.

Pipe Creek: See Ohio-Belmont Co., 966.

Pipe Creek road: See Ohio-Belmont Co., 966.

Pipersville: See Pennsylvania-Bucks Co., 994.

Pisceo: See New York-Hamilton Co., 875.

Pisgah, Mount: See Jim Thorpe, Pennsylvania-Carbon Co., 7, 78, 82, 635, 733, 766, 817, 867, 874, 1005, 1016, 1017.

Pisgah school: See Pennsylvania-Butler Co., 893.

Pittsburg: See New Hampshire-Coos Co., 842.

Pittsburgh: Pennsylvania-Allegheny Co. but see Pennsylvania-Westmoreland Co., 1054.

Pittsburgh coal: See Ohio-Belmont Co., 994. See also Pennsylvania-General, 995, 996, and Pennsylvania-Allegheny, Fayette, Somerset, Washington, and Westmoreland Cos., 893.

Pittsburgh No. 8 coal: See Ohio-Athens, Belmont, Harrison, Lawrence, and Monroe Cos., 966.

Pittsburgh Coal Co., Lindley mine: See Pennsylvania-Washington Co., 893.

Pittsburgh quadrangle: See Pennsylvania-Allegheny Co., 893.

Pittston quadrangle: See Pennsylvania-Luzerne Co., 1011.

Plattsburg: See New York-Clinton Co., 875.

Pleasant Mountain: See Maine-Oxford Co., 674.

Pleasant Valley: See Pennsylvania-Westmoreland Co., 893.

Pleasure Beach: See Waterford (township), Connecticut-New London Co., 716, 718.

Plum Creek: See New York-St. Lawrence Co., 875.

Pluto spring: See French Lick, Indiana-Orange Co., 730.

Plymouth: See New Hampshire-Grafton Co., 842.

Plymouth: See Pennsylvania-Luzerne Co., 1011.

Pochuck gneiss: See New Jersey-Passaic Co., 843, and New Jersey-Sussex Co., 45,798, 803.

Pochuck Mountain: See New Jersey-Sussex Co., 969.

Pocono formation: See Pennsylvania-Carbon Co., 733.

Pocono Mountains: See Pennsylvania-Carbon Co., 1084.

Pocono Plateau: See Pennsylvania-Carbon Co., 1005.

Poestenkill: See New York-Rensselaer Co., 875.

Point Pleasant: See Pennsylvania-Bucks Co., 995.

Point Sauble (Sable): See Wisconsin-Brown Co., 796.

Pompton Crushed Stone Co. quarry: See New Jersey-Morris Co., 843.

"Pond Ledge gray" granite: See New Hampshire-Grafton Co., 716.

Pond Ledge quarries: See New Hampshire-Grafton Co., 716.

Ponteraro & Sons strip mines, SE of and S of center of Masontown: See Pennsylvania-Fayette Co., 893.

Pope Mills: See New York-St. Lawrence Co., 875.

Porcupine Mountains: See Michigan-Upper Peninsula and Michigan-Ontonagon Co., 1044.

Poronowicz farm: See New Jersey-Warren Co., 843.

Port Deposit: See Maryland-Cecil Co., 815.

Port Henry: See New York-Essex Co., 798, 811, 843, 875, 1021.

Port Leyden: See New York-Lewis Co., 875.

Portersville: See Pennsylvania-Butler Co., 893.

Portland: See Connecticut-Middlesex Co., 78, 82, 690, 747, 753, 755, 792, 827, 836, 912, 913, 914, 915, 916, 925, 926, 934, 936, 941, 948, 958, 968, 976, 1028, 1031, 1053.

Potsdam: See New York-St. Lawrence Co., 875.

Potsdam sandstone: See New York-St. Lawrence Co., 875.

Pottersville: See New York-Warren Co., 875.

Pottsville: See Pennsylvania-Schuylkill Co., 1011.

Pottsville conglomerate: See Pennsylvania-Carbon Co., 765, 874, 1042, 1077, 1078, 1084. See also Jim Thorpe, Pennsylvania-Carbon Co., 733, 766, 817, 867, 917.

Pottsville sandstone: See Jim Thorpe, Pennsylvania-Carbon Co., 733.

Pottsville formation (Pennsylvanian): See Pennsylvania-General, 1011. See also Pennsylvania-Carbon Co., 509, 841, 1005, 1017, and Jim Thorpe, Pennsylvania-Carbon Co., 1016. See also Pennsylvania-Schuylkill Co., 1011.

Pottsville quadrangle: See Pennsylvania-Schuylkill Co., 1011.

Pottsville series: See Ohio-General, 966. See also Pennsylvania-General, 893.

Poughkeepsie: See New York-Dutchess Co., 875.

Pound: See Wisconsin-Marinette Co., 796.

Powell (township): See Michigan-Marquette Co., 970.

Powell Coal Co. strip mine: See Pennsylvania-Cambria Co., 893.

Powhattan Coal Co. slope mine: See Ohio-Belmont Co., 966.

Preakness Mountain: See New Jersey-Passaic Co., 786.

Preble: See Wisconsin-Brown Co., 796.

Precambrian gneiss: See New Jersey-Hunterdon Co., 973.

Precambrian Nonesuch shale: See Michigan-Upper Peninsula, 443.

Precambrian rocks: See New York-General, 875.

Precambrian Shield: See Michigan-Upper Peninsula, 53.

Preston: See Connecticut-New London Co., 837.

Pricetown: See Pennsylvania-Berks Co., 729, 762, 766, 1018.

Pricetown and Trexler mica mine: See Pennsylvania-Berks Co., 975.

Primrose coal: See Pennsylvania-Schuylkill Co., 1011.

Primrose (?) coal: See Pennsylvania-Carbon and Dauphin Cos., 1011.

Princeton: See Pennsylvania-Lawrence Co., 82.

Proserpine spring: See French Lick, Indiana-Orange Co., 730.

Providence: See Rhode Island-Providence Co., 896.

Province Lake: See Wakefield, New Hampshire-Carroll Co., 690.

Province Lake (village): See New Hampshire-Carroll Co., 860.

Province Lake mine: See New Hampshire-Carroll Co., 860.

Pughtown: See Pennsylvania-Chester Co., 665, 766, 975, 1018.

Pulaski: See Wisconsin-Brown Co., 796.

Pump well No. 4: See Saratoga Springs, New York-Saratoga Co., 625, 730, 869.

Pure Oil Company well: See Michigan-Osceola Co., 664.

Putnam gneiss: See Connecticut-New London Co., 716.

Pyrites: See New York-St. Lawrence Co., 875.

Q

Quabbin Aqueduct: See Massachusetts-Hampshire Co., 944.

Quabbin Reservoir: See Massachusetts-Hampshire Co., 645, 849, 925.

Quarry No. 1: See Topsham, Maine-Sagadahoc Co., 887.

Queen mine: See Belvidere group, New Jersey-Warren Co., 843.

Quincy: See Massachusetts-Norfolk Co., 715, 716, 745, 746, 773, 793, 799, 800, 801, 803, 1007.

Quincy granite: See Massachusetts-Essex Co., 793. See also Massachusetts-Norfolk Co., 745, 746, 773, 793, 799, 801, and Milton, Massachusetts-Norfolk Co., 715.

Quincy Granite Company: See Quincy, Massachusetts-Norfolk Co., 715.

Quincy mine: See Michigan-Houghton Co., 991.

Quincy mine shaft No. 2: See Michigan-Houghton Co., 992.

Quinsnicket Park: See Providence, Rhode Island-Providence Co., 896.

R

R. A. Geary or No. 1770 well: See Pennsylvania-Washington Co., 971.

Raglani Coal Co. strip mines, N of Armagh and N of Brush Valley: See Pennsylvania-Indiana Co., 893.

Randolph: See New Hampshire-Coos Co., 726.

Rapid Crocke Powerhouse well (Kaukauna): See Wisconsin-Outagamie Co., 796.

Raritan River: See New Jersey-Hunterdon Co., 843, 973.

Rattlesnake Hill: See Pennsylvania-Bucks Co., 843.

Raub mine: See New Jersey-Warren Co., 843.

Rausch Creek gap: See Pennsylvania-Schuylkill Co., 1011.

Raven Rock, Quarry at: See New Jersey-Hunterdon Co., 994.

Ravena: See New York-Albany Co., 875.

Ravena quadrangle: See Ohio-Portage Co., 966.

Raymond: See New Hampshire-Rockingham Co., 886, 1079.

"Rd. spring" (Cave-in-Rock): See Illinois-Hardin Co., 796.

Reading: See Pennsylvania-Berks Co., 635, 762, 964.

Reber Coal Co. strip mine: See Ohio-Jefferson Co., 966.

Red Ash coal: See Pennsylvania-Luzerne Co., 1011.

Red Beach: See Maine-Washington Co., 877.

Red Granite: See Wisconsin-Marathon Co., 744.

Red Granite quarry: See Wisconsin-Marathon Co., 744.

Red Hill pegmatites: See Rumford, Maine-Oxford Co., 887.

Red phase of Conway biotite granite: See White Mountains Alkaline Batholith, New Hampshire-Carroll Co., 673.

Red Spring: See Saratoga Springs, New York-Saratoga Co., 657.

"Red Westerly" granite: See Stonington (township), Connecticut-New London Co., 718.

Redding (township): See Connecticut-Fairfield Co., 690, 939.

Redford: See New York-Clinton Co., 843.

Redington: See Pennsylvania-Northampton Co., 766, 863, 865, 975.

Redstone: See New Hampshire-Carroll Co., 842, and White Mountains Alkaline Batholith, New Hampshire-Carroll Co., 673.

Redstone coal: See Pennsylvania-General, 995, and Pennsylvania-Fayette and Westmoreland Cos., 893.

Redstone granite quarries: See White Mountains Alkaline Batholith, New Hampshire-Carroll Co., 673.

Redstone Green quarry: See Conway, New Hampshire-Carroll Co., 715, 716.

Redstone Ledge: See Conway, New Hampshire-Carroll Co., 715, White Mountains Alkaline Batholith, New Hampshire-Carroll Co., 673.

Reeder and Hill Coal Co. abandoned mine 2 mi. S of Clinton: See Indiana-Vermillion Co., 967.

Reeves Station marl pit: See New Jersey-Burlington Co., 843.

Reinheimer slope mine: See Illinois-St. Clair Co., 894.

Relay: See Maryland-Baltimore Co., 815.

Remick quartz diorite: See New Hampshire-General, 674.

Rensselaer grit: See New York-Rensselaer and Saratoga Cos., 875.

Republic: See Michigan-Marquette Co., 805.

Republic (township): See Michigan-Marquette Co., 970.

Republic area: Michigan-Marquette Co. but see also Michigan-Baraga Co., 965.

Republic: See Pennsylvania-Fayette Co., 893.

Republic Coal and Coke Co., Delta mine: See Illinois-Williamson Co., 894.

Republic Steel Corp.: See New York-Clinton Co., 843.

Republic Steel mine: See New York-Franklin Co., 875.

Reservoir granite: See New York-Putnam Co., 667, and St. Lawrence Co., 713.

Reynolds mine: See Canton, Maine-Oxford Co., 887.

Reynolds Coal Co. strip mine: See Pennsylvania-Cambria Co., 893.

Reynoldsville: See Pennsylvania-Jefferson Co., 748.

Rhoades' farm: See Pennsylvania-Berks Co., 729.

Rhode Island Highway 14: See Rhode Island-Providence Co., 842.

Rhode Island Highway 102: See Rhode Island-Providence Co., 842.

Rhode Island Highway 165: See Rhode Island-Washington Co., 842.

Rich spring: See Williamstown, Massachusetts-Berkshire Co., 959.

Richard mine: See New Jersey-Morris Co., 843.

Richmond (township): See Michigan-Marquette Co., 970.

Richville: See New York-St. Lawrence Co., 942.

Ricker quarry: See Topsham, Vermont-Orange Co., 717.

Riddle mine: See Belvidere group, New Jersey-Warren Co., 843.

Ridge Farm quadrangle: See Illinois-Vermilion Co., 894.

Ridley (township): See Pennsylvania-Delaware Co., 665, 761, 766, 911.

Ridley Creek: See Pennsylvania-Delaware Co., 665, 766, 907, 908, 911.

Ridzun, John, drift mine: See Ohio-Jefferson Co., 966.

Riker Hill: See New Jersey-Essex Co., 786.

Ringwood: See New Jersey-Passaic Co., 785, 843, 876.

Ringwood mines: See New Jersey-Passaic Co., 843.

Ripogenus Dam: See Maine-Piscataquis Co., 877.

Rittenhouse Lane: See Philadelphia, Pennsylvania-Philadelphia Co., 766.

Rittenhouse quarry: See Philadelphia, Pennsylvania-Philadelphia Co., 766.

River Road, Guttenberg: See New Jersey-Hudson Co., 745, 786.

River Road, North Bergen: See New Jersey-Hudson Co., 745, 786.

Robbins Ridge: See White Mountains Alkaline Batholith, New Hampshire-Carroll Co., 673.

Roberts Hill: See New York-Greene Co., 875.

Robertsdale: See Pennsylvania-Huntingdon Co., 893.

Robeson Mountain: See Vermont-Washington Co., 716, 717.

"Robin Rock green" granite: See Massachusetts-Essex Co., 716.

Robin Rock quarry: See Massachusetts-Essex Co., 716.

Rochester: See New York-Monroe Co., 11, 935.

Rock Landing quarry: See Haddam Neck, Connecticut-Middlesex Co., 649, 788, 836, 897, 925, 934, 948.

Rock Products quarry: See New Jersey-Warren Co., 843.

Rockhill Coal Co. strip mine: See Pennsylvania-Huntingdon Co., 893.

Rockhill Coal Co. strip mine at Alvan: See Pennsylvania-Fulton Co., 893.

Rockhill Coal Co. strip minesW and S of Alvan, and at Finleyville: See Pennsylvania-Bedford Co., 893.

Rockport: See Maine-Knox Co., 883.

Rockport: See Cape Ann, Massachusetts-Essex Co., 653, 715, 716, 746, 834, 898, 899, 1006.

Rockport "gray granite": See Rockport, Cape Ann, Massachusetts-Essex Co., 715.

Rockport "green granite": See Rockport, Cape Ann, Massachusetts-Essex Co., 715.

"Rockport light gray" granite: See Rockport, Cape Ann, Massachusetts-Essex Co., 716.

"Rockport sea-green" granite: See Rockport, Cape Ann, Massachusetts-Essex Co., 716.

Rockport granite: See Rockport, Cape Ann, Massachusetts-Essex Co., 745, 746.

Rockport Granite Co.: See Rockport, Cape Ann, Massachusetts-Essex Co., 715.

Rockport quarry: See Rockport, Cape Ann, Massachusetts-Essex Co., 672.

Rocks Products Co. quarry: See Royal Green Marble Quarry, New Jersey-Warren Co., 1071.

Rockville: See Indiana-Parke Co., 967.

Rocky Hill: See New Jersey-Somerset Co., 745.

Rodney: See Pennsylvania-Westmoreland Co., 893.

Rollstone Hill: See Massachusetts-Worcester Co., 672, 778.

Rollstone Hill quarry, Fitchburg: See Massachusetts-Worcester Co., 745.

Rollstone Quarry: See Massachusetts-Worcester Co., 803.

Rome Coal Co. drift mine: See Ohio-Guernsey Co., 966.

Roosevelt Ave., Brigantine: See New Jersey-Atlantic Co., 844.

Rosa quarry: See Ryegate, Vermont-Caledonia Co., 717.

Rose Hill shale: See Pennsylvania-Huntingdon Co., 825, 826.

Rose Hill shale (?): See Pennsylvania-Centre Co., 935.

Rosevale: See Pennsylvania-Allegheny Co., 893.

Rosiclare: See Illinois-Hardin Co., 796.

Rosiclare Fluorspar Mine: See Illinois-Hardin Co., 796.

Rossie: See New York-St. Lawrence Co., 875.

Rowley: See Massachusetts-Essex Co., 745.

Roxbury: See Maine-Oxford Co., 877.

Roxbury (township): See New Jersey-Morris Co., 708.

Roy Wellmer well (Little Rapids): See Wisconsin-Brown Co., 796.

Royal Green Marble Quarry: See New Jersey-Warren Co., 1071, 1072.

Royalston: See Massachusetts-Worcester Co., 950.

Ruggles mine: See Grafton, New Hampshire-Grafton Co., 70, 646, 647, 648, 690, 745, 746, 757, 830, 859, 883, 886, 925, 943, 946, 948, 958, 974, 1040, 1053, 1061.

Rumford: See Maine-Oxford Co., 638, 639, 690, 752, 858, 887, 962, 1002, 1024.

Rumford mica mine: See Maine-Oxford Co., 1002.

Rumford Point: See Maine-Oxford Co., 877.

Rural Valley quadrangle: See Pennsylvania-Armstrong Co., 893.

Ruscombmanor (township): See Pennsylvania-Berks Co., 729, 766.

Russell: See New York-St. Lawrence Co., 875.

Russell Brothers mine: See Topsham, Maine-Sagadahoc Co., 887.

Russia Station mine: See New York-Clinton Co., 843.

Rutgers mine: See New York-Clinton Co., 843.

Ryegate: See Vermont-Caledonia Co., 717.

Ryegate granodiorite: See Vermont-Caledonia Co., 1020.

S

S. and A. Coal Corp. mine 2.5 mi. NE of Dugger: See Indiana-Greene Co., 967.

S. and S. Coal Co. strip mine: See Ohio-Columbiana Co., 966.

S.R.R. Well: See Morning Sun, Ohio-Preble Co., 903.

Sable Mountain: See White Mountains Alkaline Batholith, New Hampshire-Carroll Co., 673.

Saco River: See Conway, New Hampshire-Carroll Co., 715.

Safair Flying Services, Inc.: See Pennsylvania-Carbon Co., 1076.

Sager Coal Co. drift mine: See Pennsylvania-Westmoreland Co., 893.

Sahara Coal Co. Mine No. 5: See Illinois-Saline Co., 894.

Sahara Coal Co. Mine No. 6: See Illinois-Saline Co., 894.

St. Clair Run: See Pennsylvania-Cambria Co., 893.

St. Huberts: See New York-Essex Co., 746.

St. Joseph Lead Co.: See Illinois-Hardin Co., 680.

St. Lawrence River: See New York-General and United States-General, 722.

St. Meinrad quadrangle: See Indiana-Spencer Co., 967.

St. Peter claystone: See Michigan-Bay Co., 928, 929.

St. Regis Falls: See New York-Franklin Co., 875.

Salem (township): See Derby, Vermont-Orleans Co., 854.

Salineville quadrangle: See Ohio-Jefferson Co., 966.

Salisbury: See New York-Herkimer Co., 785.

Salter quarry: See Groton (township), Connecticut-New London Co., 716, 718.

Saltonstall, Lake: See Connecticut-New Haven Co., 1035.

Sample from SW¼ NW¼ Sec. 35, T. 11S., R. 4E.: See Illinois-Johnson Co., 928, 929.

Samuel Crozer's quarry: See Pennsylvania-Delaware Co., 665, 762, 770, 911, 1018.

Sand Pond: See Byram (township), New Jersey-Sussex Co., 969.

Sand spring: See Williamstown, Massachusetts-Berkshire Co., 959.

Sandisfield: See Massachusetts-Berkshire Co., 742.

Sandy Hook: See New Jersey-Monmouth Co., 844.

Sanford group: See New York-Essex Co., 811.

Sanford Lake: See New York-Essex Co., 843.

Sanford ore bed: See New York-Essex Co., 1021.

Santella's, J. E., Mine Co. drift mine: See Pennsylvania-Westmoreland Co., 893.

Sants Coal Co. strip mine: See Pennsylvania-Westmoreland Co., 893.

Saratoga Springs: See New York-Saratoga Co., 625, 656, 657, 730, 869, 903.

Sartori quarry: See Quincy, Massachusetts-Norfolk Co., 715, 716.

Sauble (Sable), Point: See Wisconsin-Brown Co., 796.

Saxton Coal Co. mine 2 mi. SW of Oakland City: See Indiana-Gibson Co., 967.

Saxton Coal Corp. strip mine: See Illinois-Saline Co., 894.

Saybrook: See Connecticut-Middlesex Co., 968.

Scalesville: See Indiana-Warrick Co., 967.

Scanlon, W. A., & Son strip mine: See Pennsylvania-Cambria Co., 893.

Scarlet, Will, mine of Stonefort Coal Corp.: See Illinois-Williamson Co., 894.

Schooleys Mountain: See New Jersey-Morris Co., 843.

Schroeder's farm: See Pennsylvania-Berks Co., 729.

Schuylkill River: See Philadelphia, Pennsylvania-Philadelphia Co., 665, 907, 910, 1018.

Sconnelltown: See Pennsylvania-Chester Co., 766.

Scotch Plains: See New Jersey-Union County, 786.

Scotland schist: See Connecticut-Windham Co., 842.

Scranton: See Pennsylvania-Lackawanna Co., 1011.

Scranton quadrangle: See Pennsylvania-Lackawanna Co.,1011.

Scribner, Fred, mine: See Albany, Maine-Oxford Co., 887.

Scrub Oaks mine: See New Jersey-Morris Co., 843.

Sea Isle City: See New Jersey-Cape May Co., 844.

Seal Harbor: See Maine-Hancock Co., 877.

Seaside Park: See New Jersey-Ocean Co., 844.

Sebago: See Maine-Cumberland Co., 877.

Seboomook: See Maine-Somerset Co., 877.

Second Ave., Asbury Park: See New Jersey-Monmouth Co., 844.

Second Watchung basalt: See New Jersey-Essex, Passaic, and Union Cos., 786.

Second Watchung Mountain: See New Jersey-Union Co., 745.

Second Watchung Mountain trap: See New Jersey-Union Co., 745.

Seelyville: See Indiana-Vigo Co., 967.

Selinsgrove: See Pennsylvania-Snyder Co., 935.

Serpentine Barrens: See Pennsylvania-Chester Co., 927.

Severance: See New York-Essex Co., 875.

Sevey: See New York-St. Lawrence Co., 875.

Seward: See Pennsylvania-Westmoreland Co., 893.

Sewickley coal: See Pennsylvania-Fayette Co., 893.

Seymour: See Wisconsin-Outagamie Co., 796.

Shade Gap: See Pennsylvania-Huntingdon Co., 935.

Shaft No. 7 of Delaware Aqueduct: See New York-Dutchess Co., 1030.

Shamokin: See Pennsylvania-Northumberland Co., 1011.

Shamokin quadrangle: See Pennsylvania-Northumberland Co., 1011.

Shank, A. C., Coal Co. drift mine: See Pennsylvania-Cambria Co., 893.

Shannon Run road: See Ohio-Belmont Co., 966.

Sharon No. 1 coal mine: See Ohio-Jackson Co., 966.

Sharop Mountain: See Pennsylvania-Schuylkill Co., 1011.

Sharpsburg: See Ohio-Athens Co., 966.

Shasta Coal Corp. mine 2.6 mi. NW of Edwardsport: See Indiana-Knox Co., 967.

Shawangunk conglomerate (?): See New Jersey-Sussex Co., 935.

Shawano: See Wisconsin-Shawano Co., 796.

Shawneetown: See Illinois-Gallatin Co., 894.

Shawneetown quadrangle: See Illinois-Gallatin Co., 894.

Shawneetown Coal Co. drift mine: See Illinois-Gallatin Co., 894.

Sheffield: See Massachusetts-Berkshire Co., 780.

Sheldon, E. F. (samarskite discovery): See Connecticut-Middlesex Co., 913.

Shenandoah: See Pennsylvania-Schuylkill Co., 1011.

Shenandoah quadrangle: See Pennsylvania-Schuylkill Co., 1011.

Sherman spring: See Williamstown, Massachusetts-Berkshire Co., 959.

Sherrer quarry: See Williams quarry, Easton, Pennsylvania-Northampton Co., 669, 759, 861, 865, 873, 983, 1012, 1013.

Sherwood mine: See Iron River District, Michigan-Iron Co., 995.

Sherwood-Templeton Coal Co. mine 3.5 mi. S of Hymera: See Indiana-Sullivan Co., 967.

Shiloh: See Pennsylvania-Clearfield Co., 748.

Ship Creek: See Pennsylvania-Delaware Co., 770, 911.

Shirley: See Wisconsin-Brown Co., 796.

Shirleysburg: See Pennsylvania-Huntingdon Co., 935.

Sieserman, George, well (Seymour): See Wisconsin-Outagamie Co., 796.

Silurian limestone: See Wisconsin-Brown and Door Cos., 796.

Silurian-Ordovician slate: See New York-Washington Co., 875.

Silver Coal Co. Coal Bluff Mine: See Pennsylvania-Fayette Co., 893.

Silverthorne mine: See New Jersey-Hunterdon Co., 843.

Sipos Coal Co. Mine No. 3, drift mine: See Pennsylvania-Indiana Co., 893.

Skanee: See Michigan-Baraga Co., 41, 632, 840.

Skidmore coal: See Pennsylvania-Schuylkill Co., 1011.

Slabtown: See Pennsylvania-Armstrong Co., 893.

Slack Coal Co. drift mine: See Ohio-Muskingum Co., 966.

Sligo: See Pennsylvania-Clarion Co., 893.

Sligo Creek: See Maryland-Montgomery Co., 888.

Sloane Physical Laboratory: See Connecticut-New Haven Co., 933.

Smalley quarry N of Westerly: See Rhode Island-Washington Co., 751.

Smedley's, Ahinam, farm: See Pennsylvania-Delaware Co., 665, 911, 1018.

Smicksburg quadrangle: See Pennsylvania-Jefferson Co., 748.

Smith (?) feldspar quarry: See New Hampshire-Rockingham Co., 1079.

Smith, E. E., mine: See New Hampshire-Grafton Co., 886.

Smith, E. E., upper mine: See Alexandria, New Hampshire-Grafton Co., 690.

Smith mine: See New Hampshire-Sullivan Co., 937.

Smith mine: See New York-Essex Co., 78, 82, 811, 843, 995.

Smith quarry: See Westerly, Rhode Island-Washington Co., 715, 716, 751.

Smith Granite Co.: See Westerly, Rhode Island-Washington Co., 715.

Smith's quarry: See Pennsylvania-Montgomery Co., 665.

Smithton: See Pennsylvania-Westmoreland Co., 893.

Smock Coal Co. mine 1.5 mi. SW of Switz City: See Indiana-Greene Co., 967.

Snake Hill formation: See New York-Orange and Ulster Cos., 875.

Snake Hill shale: See New York-Orange and Washington Cos., 875.

Solomen's Run: See Pennsylvania-Cambria Co., 893.

Somerset quadrangle: See Pennsylvania-Somerset Co., 893.

Somerville: See Maine-Lincoln Co., 858.

Somerville: See New Jersey-Somerset Co., 786.

Somerville, abandoned copper mine: See New Jersey-Somerset Co., 973.

Souhegan quarry: See Milford, New Hampshire-Hillsboro Co., 715, 716.

South spring: See Morning Sun, Ohio-Preble Co., 903.

South Acworth: See New Hampshire-Sullivan Co., 930.

South Bethlehem: See Pennsylvania-Armstrong Co., 893.

South Bridgton: See Maine-Oxford Co., 877.

South Brookline station: See New Hampshire-Hillsboro Co., 716.

South Colton: See New York-St. Lawrence Co., 875.

South Coventry (township): See Pennsylvania-Chester Co., 766.

South Doublehead Mountain: See White Mountains Alkaline Batholith, New Hampshire-Carroll Co., 673.

South Glastonbury: See Glastonbury (township), Connecticut-Hartford Co., 968.

South Keyser Ave., Scranton: See Pennsylvania-Lackawanna Co., 1011.

South Lyme: See Connecticut-New London Co., 837, 853, 968.

South Lynnfield: See Massachusetts-Essex Co., 716.

South Milford: See Milford, New Hampshire-Hillsboro Co., 715.

South Mountain: See Pennsylvania-Northampton Co., 766, 865, 927, 1018, and Pennsylvania-Northampton and Lehigh Cos., 863.

South Mountains: See Pennsylvania-Northampton Co., 762.

South Orange: See Massachusetts-Franklin Co., 950.

South Paris: See Maine-Oxford Co., 877, 962.

South Peak: See New Hampshire-Grafton Co., 697.

South Quincy: See Massachusetts-Norfolk Co., 746.

South Ryegate: See Vermont-Caledonia Co., 717.

South Windsor: See Massachusetts-Berkshire Co., 739.

South Wolfeboro: New Hampshire-Carroll Co. but see New Hampshire-Strafford Co., 842.

Southbridge: See Massachusetts-Worcester Co., 793.

Southern Field (a coal field): See Pennsylvania-General, 1011. See Pennsylvania-Carbon, Dauphin, Lebanon, and Schuylkill Cos., 1011.

Southford: See Connecticut-New Haven Co., 736, 934, 968.

Southwest: See Pennsylvania-Westmoreland Co., 893.

Southwestern Illinois Coal Co. strip mine: See Illinois-Randolph Co., 894.

Spaulding quartz-diorite: See New Hampshire-Sullivan Co., 695.

Spectacle Pond: See New Hampshire-Grafton Co., 694.

Speculator: See New York-Hamilton Co., 875.

Speer coal (correlative of Mahoning coal): See Pennsylvania-Bedford Co., 893.

Spinelli pegmatite: See Glastonbury (township), Connecticut-Hartford Co., 754.

Spinelli prospect: See Glastonbury (township), Connecticut-Hartford Co., 690.

Spinelli quarry: See Glastonbury (township), Connecticut-Hartford Co., 706, 925, 948, 1012,

Sprague's granite quarry: See Maine-Sagadahoc Co., 703.

Sprague's Hill: See Maine-Sagadahoc Co., 923.

Sprankle Mills: See Pennsylvania-Jefferson Co., 748.

Spring on Smithfield Ave. near reservoir: See Providence, Rhode Island-Providence Co., 896.

Spring on Woonsocket carline: See Providence, Rhode Island-Providence Co., 896.

Springfield (township): See Pennsylvania-Delaware Co., 665, 766.

Spring Valley: See Illinois-Bureau Co., 928, 929.

Springvale: See Maine-York Co., 877.

Sprout Brook: See New York-Putnam Co., 843.

Spurgeon: See Indiana-Pike Co., 967.

Stafford: See Connecticut-Tolland Co., 793.

Stafford: See Ohio-Monroe Co., 966.

Standpipe Hill near Topsham: See Maine-Sagadahoc Co., 1026.

Stanton: See Pennsylvania-Jefferson Co., 748.

Stanton, Mount: See White Mountains Alkaline Batholith, New Hampshire-Carroll Co., 673.

Star Lake: See New York-St. Lawrence Co., 843, 875.

Stark: See New Hampshire-Coos Co., 716.

"Stark" granite: See New Hampshire-Coos Co., 716.

Starkey Corners: See Maine-Aroostook Co., 843.

Starkey Corners molybdenum prospect: See Maine-Aroostook Co., 843.

State College: See University Park, Pennsylvania-Huntingdon Co., 935.

Staten Island, New York City: See New York-Richmond Co., 745, 786.

Staunton: See Indiana-Clay Co., 967.

Stearns Mountain mine: See Albany, Maine-Oxford Co., 887.

Sterchen and Heim's mine 1.6 mi. E of Yankeetown: See Indiana-Warrick Co., 967.

Sterling: See New York-Cayuga Co., 935.

Sterling (township): See Connecticut-Windham Co., 716, 718.

Sterling station: See Sterling (township), Connecticut-Windham Co., 716.

Sterling granite: See Stonington (township), Connecticut-New London Co., 716, 718, and Sterling (township), Connecticut-Windham Co., 718.

Sterling granite gneiss: See Sterling (township), Connecticut-Windham Co., 716, and Rhode Island-Providence and Washington Cos., 842.

Sterling Coal Co. drift mine: See Pennsylvania-Cambria Co., 893.

Sterling Furnace: See New York-Orange Co., 843.

Sterling Furnace mines: See New York-Orange Co., 843.

Sterling Hill: See New Jersey-Sussex Co., 45, 798, 803.

Sterling Hill mine: See Franklin, New Jersey-Sussex Co., 846.

Steubenville: See Ohio-Jefferson Co., 966.

Steubenville quadrangle: See Ohio-Jefferson Co., 966.

Stevens Farm: See New Jersey-Morris Co., 843.

Stockbridge limestone: See New York-Dutchess Co., 875.

Stockton: See New Jersey-Hunterdon Co., 509, 973, 994, 1005, 1072, 1073.

Stockton Ave., Seaside Park: See New Jersey-Ocean Co., 844.

Stockton formation (Triassic): See New Jersey-General, 1005, and New Jersey-Hunterdon Co., 509, 973, 994, 995, 996. See also Pennsylvania-General, 1005, and Pennsylvania-Bucks Co., 995, 996.

Stone spring: See Bloomington, Indiana-Monroe Co., 903.

Stonefort Coal Corp., Will Scarlet mine: See Illinois-Williamson Co., 894.

Stoneham: See Maine-Oxford Co., 655, 822, 858, 887, 962.

Stonington (township): See Connecticut-New London Co., 716, 718, 754.

Stony Creek: See New York-Warren Co., 875.

Stony Run: See Baltimore, Maryland-Baltimore Co., 888.

Storm King granite: See New York-Dutchess, Orange, and Putnam Cos., 667.

Storm King granite gneiss: See New York-Orange and Westchester Cos., 842.

Stoutenberg mine: See New Jersey-Morris Co., 843.

Stow: See Maine-Oxford Co., 877.

Strafford: See New Hampshire-Strafford Co., 690.

Stratford: See New York-Fulton Co., 875.

Strickland mine: See Strickland and Cramer mines, Portland, Connecticut-Middlesex Co., 690.

Strickland and Cramer mines: See Portland, Connecticut-Middlesex Co., 690.

Strickland (or Collins Hill) quarry: See Portland, Connecticut-Middlesex Co., 78, 82, 709, 753, 754, 755, 792, 827, 915, 925, 926, 934, 936, 941, 948, 958, 1058.

Stuart Evans property: See Pennsylvania-Carbon Co., 817.

Stump Creek: See Pennsylvania-Jefferson Co., 748.

Stuyvesant: See New York-Columbia Co., 875.

Styles, G. H., Co. strip mine: See Pennsylvania-Clarion Co., 893.

Suamico: See Wisconsin-Brown Co., 796.

Suamico Dairy well: See Wisconsin-Brown Co., 796.

Sulphur (or Sulfur) Hill mine: See New Jersey-Sussex Co., 843, 961.

Sugar Hill: See New York-Essex Co., 843.

Sugarloaf Mountain: See Stoneham, Maine-Oxford Co., 887.

Sullivan quarry: See Bradford, Rhode Island-Washington Co., 901.

Summerville: See Pennsylvania-Jefferson Co., 748.

Summit: See New Jersey-Union Co., 745, 786.

Sunapee: See New Hampshire-Sullivan Co., 715.

Sunapee quadrangle: See New Hampshire-Sullivan Co., 695.

Sunapee quarry: See Sunapee, New Hampshire-Sullivan Co., 715.

Sunbury shale: See Michigan-Osceola Co., 664. See also Ohio-General, 824. See also United States-General, 405.

Sunlight Coal Co. mine 2.6 mi. NW of Boonville: See Indiana-Warrick Co., 967.

Surf City (at 8th St.): See New Jersey-Ocean Co., 844.

Suspension Bridge, Vicinity of: See Philadelphia, Pennsylvania-Philadelphia Co., 927.

Susquehanna Fuel Co. drift mine: See Pennsylvania-Cambria Co., 893.

Sutton Station: See Pennsylvania-Clarion Co., 748.

Swampscott: See Massachusetts-Essex Co., 1008.

Swampscott Beach: See Massachusetts-Essex Co., 643.

Swarthmore: See Pennsylvania-Delaware Co., 1018.

Swatara iron sandstone (?): See Pennsylvania-Monroe and Schuylkill Cos., 935.

Swayze mine: See New Jersey-Hunterdon Co., 843.

Swede Hill: See Pennsylvania-Westmoreland Co., 893.

Sweeney Granite Works: See Westerly, Rhode Island-Washington Co., 715.

Swingle quarry, Quincy: See Massachusetts-Norfolk Co., 745, 746, 793, 799, 803.

Switz City: See Indiana-Greene Co., 967.

Switz City quadrangle: See Indiana-Greene Co., 967.

Syenite quarries: See Wausau, Wisconsin-Marathon Co., 744.

Sykesville: See Maryland-Carroll Co., 815.

T

T. J. Ward strip mine: See Pennsylvania-Westmoreland Co., 893.

Taconic Parkway: See New York-Putnam Co., 1027, 1033.

Tacony Creek: See Philadelphia, Pennsylvania-Philadelphia Co., 665, 766.

Tacony Creek Valley: See Philadelphia, Pennsylvania-Philadelphia Co., 766.

Tahawus Club: See New York-Essex Co., 843.

Talcville: See New York-St. Lawrence Co., 875.

Tamarack mine: See Michigan-Houghton Co., 991, 992.

Tasa Coal Co. strip mine: See Pennsylvania-Butler Co., 893.

Taunton: See Massachusetts-Bristol Co., 950, 951.

Taylor mine: See New Jersey-Morris Co., 843.

Teal Lake: See Michigan-Menominee and Marquette Cos., 1022.

Tecumseh Coal Corp. mine 2.5 mi. SE of Scalesville: See Indiana-Warrick Co., 967.

Tecumseh Coal Corp. mine 6 mi. SE of Lynnville: See Indiana-Warrick Co., 967.

Ten Mile Creek, S fork: See Pennsylvania-Greene Co., 893.

Terre Haute: See Indiana-Vigo Co., 967.

Texas: See Maryland-Baltimore Co., 815.

Thad D. Isham uranium lease: See Michigan-Dickinson Co., 1048.

Thames River: See Groton (township), Connecticut-New London Co., 716, 718.

The Glen: See New York-Warren Co., 875.

Theresa: See New York-Jefferson Co., 875.

Third Watchung basalt: See New Jersey-Essex and Passaic Cos., 786.

Thomas, John, Coal Co. drift mine: See Pennsylvania-Westmoreland Co., 893.

Thomaston: See Connecticut-Litchfield Co., 934, 968.

Thompson Lake, Unnumbered road on E side of: See Maine-Oxford Co., 877.

Thompson's Fall: See White Mountains Alkaline Batholith, New Hampshire-Carroll Co., 673.

Thompson's farm: See Maryland-Prince Georges Co., 777.

Thorold sandstone: See New York-Monroe Co., 935.

Throop: See Pennsylvania-Lackawanna Co., 1011.

Thwaites, Harry, farm: See Maine-Aroostook Co., 843.

Ticonderoga: See New York-Essex Co., 875.

Tilden (township): See Michigan-Marquette Co., 970.

Tilly Foster mine: See New York-Putnam Co., 986, 987.

Timblin: See Pennsylvania-Jefferson Co., 748.

Tims Hill locality: See Haddam, Connecticut-Middlesex Co., 753.

Toll Gate mine: See Middletown, Connecticut-Middlesex Co., 690.

Tonella new quarry: See Milford, New Hampshire-Hillsboro Co., 715.

Tonella old quarry: See Milford, New Hampshire-Hillsboro Co., 715, 716.

Tonella King quarry: See Milford, New Hampshire-Hillsboro Co., 716.

Top Ross coal: See Pennsylvania-Luzerne Co., 1011.

Topsfield: See Maine-Washington Co., 877.

Topsham: See Maine-Sagadahoc Co., 687, 703, 858, 887, 889, 891, 900, 923, 925, 938, 948, 962, 1026, 1037, 1038, 1055, 1056.

Topsham: See Vermont-Orange Co., 717.

Tosh, E. P., strip mine: See Pennsylvania-Westmoreland Co., 893.

Toss coal: See Pennsylvania-Luzerne Co., 1011.

Tower City: See Pennsylvania-Schuylkill Co. but see also Pennsylvania-Lebanon Co., 1011.

Tower City quadrangle: See Pennsylvania-Lebanon and Schuylkill Cos., 1011.

Tower Hill: See Rhode Island-Washington Co., 751.

Town Well No. 2 (Preble): See Wisconsin-Brown Co., 796.

Tracy coal: See Pennsylvania-Schuylkill Co., 1011.

Tradewater formation, coal beds: See Illinois-General, 894.

Traverse limestone: See Michigan-Osceola Co., 664.

Treml, George, well (Shirley): See Wisconsin-Brown Co., 796.

Trenton limestone: See Michigan-Bay Co., 928, 929.

Trenton quarry: See Topsham, Maine-Sagadahoc Co., 887.

Tresckow: See Pennsylvania-Carbon Co., 994, 1011.

Trexler mica mine: See Pennsylvania-Berks Co., 766.

Tri-County Coal Co. strip mines, 4 and 4½ mi. S of Murrinsville: See Pennsylvania-Butler Co., 893.

Tri-State Mining Corp. mine 1 mi. NE of Dugger: See Indiana-Sullivan Co., 967.

Triassic beds: See New Jersey-General and Pennsylvania-General, 1005.

Triassic magnetite ore: See Pennsylvania-Berks, Chester, and Lebanon Cos., 786.

Triassic rocks: See Connecticut-General, 820. See also New Jersey-Hunterdon Co. and Pennsylvania-Bucks Co., 995, 996.

Triassic Newark group: See New Jersey-General, 994.

Trott Cove mine: See Woolwich, Maine-Oxford Co., 887.

Trotter mine: See New Jersey-Sussex Co., 700, 734, 808, 810, 890, 969.

Truax-Traer Coal Co. Burning Star No. 1 drift and strip mines: See Illinois-Jackson Co., 894.

Truax-Traer Coal Co. Mine No. 2: See Illinois-Perry Co., 894.

Tucker Island: See New Jersey-Ocean Co., 844.

Tully limestone: See New York-Central Part, 985.

Tupper Lake: See New York-Franklin Co., 875.

Turkey Hill: See Haddam, Connecticut-Middlesex Co., 934, 976.

Turner Coal & Clay Co. mine 1.3 mi. N of Carbon: See Indiana-Parke Co., 967.

Tuscarora: See Pennsylvania-Schuylkill Co., 1011.

Tuscarora quartzite: See Pennsylvania-Huntingdon Co., 825, 826.

Tussey Mountain: See Pennsylvania-Huntingdon Co., 825, 826.

Tuxedo Park quarry: See New York-Orange Co., 637.

Tyringham: See Massachusetts-Berkshire Co., 742.

U

Uhrichsville quadrangle: See Ohio-Tuscarawas Co., 966.

Ulishny Fuel Co. drift mine: See Pennsylvania-Westmoreland Co., 893.

Union, Mount: See Pennsylvania-Huntingdon Co., 935.

Union City: See Indiana-Randolph Co., 903.

Unionvale: See Ohio-Harrison Co., 966.

Unionville: See Pennsylvania-Chester Co., 665, 766, 927.

Unionville: Pennsylvania-Beaver Co. but see Pennsylvania-Butler Co., 893.

U.S.A.E.C. (exploration work): See Jim Thorpe, Pennsylvania-Carbon Co., 733, 867.

U.S.A.E.C. (raw materials development laboratory): See Massachusetts-Middlesex Co., 1082.

U.S.B.M. (tests): See Pennsylvania-Washington Co., 971.

U.S.G.S. (exploration work): See Jim Thorpe, Pennsylvania-Carbon Co., 733, 867.

U.S.G.S. (radioactivity determinations): See Illinois-Hardin Co., 680.

U.S.G.S. surveys (airborne): See Michigan-Northern Peninsula, 1052.

U.S. Coast Guard Station 112: See Island Beach, New Jersey-Ocean Co., 844.

U.S. Highway 1: See Connecticut-New Haven Co., 842. See also Maine-Hancock and Washington Cos., 877.

U.S. Highway 2: See Maine-Oxford Co., 877. See also New Hampshire-Carroll and Coos Cos., 842. See also New York-Rensselaer Co., 875.

U.S. Highway 3: See New Hampshire-Coos and Grafton Cos., 842.

U.S. Highway 4: See New York-Franklin and Washington Cos., 875.

U.S. Highway 5: See Vermont-Orange and Windham Cos., 842.

U.S. Highway 6: See Connecticut-Windham Co. and New York-Westchester Co., 842.

U.S. Highway 7: See Connecticut-Litchfield Co., 842.

U.S. Highway 9: See New York-Putnam Co., 842. See also New York-Essex and Warren Cos., 875.

U.S. Highway 9W: See New York-Orange and Ulster Cos., 875.

U.S. Highway 11: See Pennsylvania-Luzerne Co., 1011.

U.S. Highway 19: See Pennsylvania-Butler and Lawrence Cos., 893.

U.S. Highway 20: See Massachusetts-Worcester Co., 793.

U.S. Highway 22: See Ohio-Jefferson Co., 966. See also Pennsylvania-Butler Co., 893.

U.S. Highway 22-40: See Ohio-Muskingum Co., 966.

U.S. Highway 40: See Ohio-Guernsey Co., 966.

U.S. Highway 50 (alternate): See Ohio-Athens Co., 966.

U.S. Highway 122: See Pennsylvania-Columbia and Schuylkill Cos., 1011.

U.S. Highway 202: See Maine-Kennebec Co., 877

U.S. Highway 209: See New York-Sullivan Co., 875. See also Pennsylvania-Carbon, Luzerne, Schuylkill Cos., 1011.

U.S. Highway 224: See Ohio-Portage Co., 966.

U.S. Highway 302: New Hampshire-Carroll Co. but see New Hampshire-Carroll and Coos Cos., 842.

U.S. Highway 309: See Jim Thorpe, Pennsylvania-Carbon Co., 733, 817, 867.

U.S. Highway 322: See Pennsylvania-Clearfield and Jefferson Cos., 748.

U.S. Highway 611: See Pennsylvania-Bucks Co., 994.

University Park (formerly State College): See Pennsylvania-Huntingdon Co., 935.

Upland: See Pennsylvania-Delaware Co., 762, 766, 911, 1018.

Upper Block coal: See Indiana-Southwest Part, Clay, Greene, Owen, Parke Cos., 967.

Upper Chichester (township):See Pennsylvania-Delaware Co., 665, 766.

Upper Clarion coal: See Pennsylvania-General, 995. See Pennsylvania-Butler Co., 893. See Pennsylvania-Clarion and Jefferson Cos., 748.

Upper Freeport bed: See Pennsylvania-Clearfield Co., 995.

Upper Freeport coal: See Pennsylvania-General, 995. See Pennsylvania-Armstrong, Bedford, Blair, Butler, and Cambria Cos., 893. See Pennsylvania-Clearfield Co., 748, 893. See Pennsylvania-Fayette and Indiana Cos., 893. See Pennsylvania-Jefferson Co., 748. See Pennsylvania-Somerset Co., 893.

Upper Freeport, E or, coal: See Pennsylvania-Clearfield Co., 748.

Upper Freeport No. 7 coal: See Ohio-Athens, Guernsey, Jefferson, and Muskingum Cos., 966.

Upper Freeport Rider coal: See Pennsylvania-Clearfield Co., 748.

Upper Huronian(?) series: See Michigan-Marquette Co., 841.

Upper Jay: See New York-Essex Co., 875.

Upper Kittanning coal: See Pennsylvania-General, 995, See Pennsylvania-Armstrong, Butler, Cambria Cos., 893. See also Pennsylvania-Clearfield and Jefferson Cos., 748.

Upper Kittanning, C' or, coal: See Pennsylvania-Clearfield Co., 748.

Upper Merryall: See Connecticut-Litchfield Co., 737, 934, 968, 976.

Upper Milford (township): See Pennsylvania-Lehigh Co., 766.

Upper Peninsula: See Michigan-Baraga Co., 1051, and Michigan-Marquette Co., 805, 883.

Upper Pigeon Hill quarry: See Rockport, Cape Ann, Massachusetts-Essex Co., 715, 745, 802.

V

Van Ormer: See Pennsylvania-Cambria Co., 893.

Van Syckles mine: See New Jersey-Hunterdon Co., 843.

Vanport limestone: See Pennsylvania-Clarion Co., 748.

Velpen quadrangle: See Indiana-Pike Co., 967.

Vera Cruz: See Pennsylvania-Lehigh Co., 766, 863, 864.

Verdolite quarry: See Pennsylvania-Northampton Co., 661.

"Vermont blue" granite: See Vermont-Caledonia Co., 716, 717.

Vermont Highway 105: See Vermont-Essex Co., 842.

Vermont Highway 114: See Vermont-Essex Co., 842.

Vernon: See New Jersey-Sussex Co., 846, 1062.

Vesely Brothers' drift mine: See Pennsylvania-Fayette Co., 893.

Vetera: See Pennsylvania-Cambria Co., 893.

Village Well (Coleman): See Wisconsin-Marinette Co., 796.

Village Well (Lena): See Wisconsin-Oconto Co., 796.

Village Well in Point Sauble (Sable): See Wisconsin-Brown Co., 796.

Vinalhaven: See Maine-Knox Co., 787, 858.

Vineyard mine: See New York-Essex Co., 843.

Volusa silt loam: See New York-Yates Co., 868.

Voorhis quarry: See Greenwich, Connecticut-Fairfield Co., 716, 718.

W

W. Green Fluorspar Mine: See Illinois-Hardin Co., 796.

W. A. Scanlon & Son Coal Co. strip mine: See Pennsylvania-Cambria Co., 893.

W. H. Perry Co.: See Sunapee, New Hampshire-Sullivan Co., 715.

W. P. McQ. spring: See Morning Sun, Ohio-Preble Co., 903.

Wm. H. Hutzel Coal Co. drift mine: See Pennsylvania-Indiana Co., 893.

Waits River formation: See Vermont-Orange Co., 1020.

Wakefield: See Michigan-Gogebic Co., 745.

Wakefield: See New Hampshire-Carroll Co., 690, 726, 860, 886, 895.

Walden: See Vermont-Washington Co., 717.

Wallkill River bridge: See New York-Ulster Co., 875.

Walnut Hill: See Huntington, Massachusetts-Hampshire Co., 738, 739, 797.

Walter Birr well (Oconto Falls): See Wisconsin-Oconto Co., 796.

Walter Kimbs well (Mills Center): See Wisconsin-Brown Co., 796.

Wampanoag spring: See Williamstown, Massachusetts-Berkshire Co., 959.

Wanakena: See New York-St. Lawrence Co., 875.

Wappinger marble: See New York-Dutchess Co., 875.

Ward, T. J., strip mine: See Pennsylvania-Westmoreland Co., 893.

Ward quarry: See Massachusetts-Hampshire Co., 716.

Wardwell mine: See Albany, Maine-Oxford Co., 887.

Wardwell No. 1 mine: See Albany, Maine-Oxford Co., 690.

Wardwell quarry: See Albany, Maine-Oxford Co., 1019.

Ware: See Massachusetts-Hampshire Co., 738.

Ware Center: See Massachusetts-Hampshire Co., 645.

Warner Mountain: See Massachusetts-Berkshire Co., 780.

Warren Furnace: See New Jersey-Warren Co., 843.

Warrensburg: See New York-Warren Co., 875.

Warwick (township): See New York-Orange Co., 810, 920, 921.

Washington: See Massachusetts-Berkshire Co., 739, 742.

Washington: See Pennsylvania-Washington Co., 893.

Washington gneiss: See Massachusetts-Berkshire Co., 742.

Washington mine: See New Jersey-Warren Co., 843, 876.

Washington Heights: See New York City, New York-New York Co., 652, 693, 768, 784, 1021.

Washingtonville: See New York-Orange Co., 875.

Watchung Mountains: See New Jersey-General, 798, (See also First Watchung Mountain, Second Watchung Mountain, and Third Watchung Mountain).

Waterford (township): See Connecticut-New London Co., 716, 718, 754, 934, 968.

Waterford: See Maine-Oxford Co., 877, 887.

Waterford quarry: See Waterford (township), Connecticut-New London Co., 716, 718.

Waterloo quadrangle: See Illinois-St. Clair Co., 894.

Watersmeet: See Michigan-Upper Peninsula and Michigan-Gogebic Co., 1044.

Watertown: See Connecticut-Litchfield Co., 950, 968.

Watertown: See Massachusetts-Middlesex Co., 1060.

Watt's Creek: See Pennsylvania-Clearfield Co., 748.

Wausau: See Wisconsin-Marathon Co., 743, 744, 883, 994, 995, 996, 1009, 1010.

Wayne: See Maine-Kennebec Co., 787.

Waynesburg coal: See Pennsylvania-Fayette and Greene Cos., 893.

Waynesburg quadrangle: See Pennsylvania-Greene Co., 893.

Webb Pink Granite Co.: See Milford, Massachusetts-Worcester Co., 715.

Weber's quarry: See Pennsylvania-Northampton Co., 863.

Wedig Krubsach well (Embarrass): See Wisconsin-Waupaca Co., 796.

Weeks Brook: See White Mountains Alkaline Batholith, New Hampshire-Carroll Co., 673.

Weeks mine: See Wakefield, New Hampshire-Carroll Co., 886.

Weeks quarry: See Wakefield, New Hampshire-Carroll Co., 690.

Weikert Coal Co. slope mine: See Ohio-Columbiana Co., 966.

Weimer spring: See Bloomington, Indiana-Monroe Co., 903.

Welch mine: See New Jersey-Hunterdon Co., 843.

Welchville: See Maine-Oxford Co., 877.

Well (unnamed): See Wisconsin-Dane Co., 796.

Well in Sec. 2-T.14 N-R. 4 E: See Michigan-Bay Co., 928, 929.

Well in Sec. 7-T.6 S-R. 12 W: See Indiana-Posey Co., 928, 929.

Well in Sec. 10-T.1 S-R. 1 W: See Illinois-Washington Co., 928, 929.

Well in Sec. 10-T.3 S-R. 9 W: See Indiana-Gibson Co., 928, 929.

Well in Sec. 12-T.1 N-R. 1 W: See Illinois-Clinton Co., 928, 929.

Well in Sec. 23-T.6 S-R. 13 W: See Indiana-Posey Co., 928, 929.

Well in Sec. 26-T.4 S-R. 2 E: See Illinois-Jefferson Co., 928, 929.

Well in Sec. 26-T.4 N-R. 7 E: See Illinois-Clay Co., 928, 929.

Well in Sec. 30-T.18 N-R. 10 W: See Michigan-Osceola Co., 928, 929.

Well in Sec. 31-T.18 N-R. 10 W: See Michigan-Osceola Co., 928, 929.

Well in Sec. 34-T.5 S-R. 6 E: See Illinois-Jefferson Co., 928, 929.

Well in Sec. 35-T.2 S-R. 1 E: See Illinois-Jefferson Co., 928, 929.

Well in Sec. 35-T.4 N-R. 1 E: See Illinois-Marion Co., 928, 929.

Wellington Hill: See Vermont-Windham Co., 855.

Wellmer, Roy, well (Little Rapids): See Wisconsin-Brown Co., 796.

Wells Coal Co. strip mines near Barnesville: See Ohio-Belmont Co., 966.

Wells River bridge: See Groton, Vermont-Caledonia Co., 716, 717.

Wentworth, Ernest, mine in pegmatite: See Albany, Maine-Oxford Co., 887.

West quarry: See Connecticut-New Haven Co., 716.

West Alton: See New Hampshire-Belknap Co., 842.

West Bethel: See Maine-Oxford Co., 877.

West Brookfield: See Massachusetts-Worcester Co., 793.

West Chester: See Pennsylvania-Chester Co., 665, 766, 927, 1018.

West Chesterfield: See Massachusetts-Hampshire Co., 738.

West Chicago: See Illinois-McHenry Co., 823.

West Drive N of Girard Ave. bridge: See Philadelphia, Pennsylvania-Philadelphia Co., 1018.

West End (beach): See New Jersey-Monmouth Co., 844.

West Frankfort: See Illinois-Franklin Co., 928, 929.

West Frankfort quadrangle: See Illinois-Williamson Co., 894.

West Milan: New Hampshire-Coos Co. but see New Hampshire-Carroll and Coos Cos., 842.

West Minot: See Maine-Androscoggin Co. but see also Maine-Oxford Co., 877.

West Newfield: See Maine-York Co., 877.

West Ossipee: New Hampshire-Carroll Co. but see New Hampshire-Carroll and Coos Cos., 842.

West Paris: See Maine-Oxford Co., 887.

West Pelham: See Massachusetts-Hampshire Co., 716.

West Peru: See Maine-Oxford Co., 887.

West Philadelphia: See Pennsylvania-Philadelphia Co., 761.

West Pikeland (township): See Pennsylvania-Chester Co., 665, 766.

West Point: See New York-Orange Co., 666, 842, 843, 846, 950, 1021.

West Point quadrangle: See New York-Dutchess, Orange, and Putnam Cos., 667.

West Point Military Academy, reservoir: See New York-Orange Co., 843.

West Point Military Reservation: See New York-Orange Co., 842.

West Quincy: See Massachusetts-Norfolk Co., 793.

West Windsor: See Vermont-Windsor Co., 716, 717.

West Windsor (township): See Vermont-Windsor Co., 918.

Westerly: See Rhode Island-Washington Co., 715, 716, 726, 739, 751, 787, 806, 837, 901, 916.

Westerly granite: See Groton (township), Connecticut-New London Co., 716, 718.

Westerly granites: See Rhode Island-Washington Co., 716, 739, 916.

Westerly granites (various types): See Bradford and Westerly, Rhode Island-Washington Co., 715.

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General (contd.)
Uranium Occurrences
General:
uranophane, heated and exposed to ultraviolet light during heating, had its fluorescence fade and disappear at a temperature of 65° C.; never regained full fluorescence but showed faint white color under lamp: 728.
Bibliography: briefly annotated; includes a few older papers on uranium occurrences: 769.
Bibliography of U.S.G.S. reports: 572, 1004.
Uranophane Occurrences
General: pegmatites contain uranophane among other minerals: 968; uranophane, heated and exposed to ultraviolet light during heating, had its fluorescence fade and disappear at a temperature of 65° C.; never regained full fluorescence but showed faint white color under lamp: 728.
Xenotime Occurrences
General: pegmatites contain xenotime among other minerals: 934, 968.
Triassic sedimentary rocks: some monazite and xenotime present: 820.
Yttrotantalite Occurrences
General: pegmatites contain yttrotantalite among other minerals: 968.

Aeschynite Occurrences
See under individual county names and under Index III, Aeschynite Occurrences-Connecticut: 934, 968.

Air, Thorium-bearing
See under individual county names and under Index III, Air, Thorium-bearing-Connecticut: 684, 933.

CONNECTICUT (contd.)

Allanite Occurrences
See under individual county names and under Index III, Thorium Occurrences-Connecticut: 689, 706, 716, 718, 725, 753, 754, 837, 915, 934, 949, 950, 968, 1028, 1031.

Autunite Occurrences
See under individual county names and under Index III, Autunite Occurrences-Connecticut: 690, 718, 725, 737, 753, 754, 774, 788, 792, 836, 897, 912, 915, 916, 926, 934, 958, 968, 976, 1028, 1031, 1098.

Bibliographies
Thorium Occurrences
Bibliography: briefly annotated; includes a few older papers on thorium occurrences: 769.
Uranium Occurrences
Bibliography: briefly annotated; includes a few older papers on uranium occurrences: 769.
Bibliography of U.S.G.S. reports: 572, 1004.

Columbite, Thorium-bearing
See under individual county names and under Index III, Columbite, Thorium-bearing-Connecticut: 652.

Columbite, Uranium-bearing
See under individual county names and under Index III, Columbite, Uranium-bearing-Connecticut: 721.

Cyrtolite Occurrences
See under individual county names and under Index III, Cyrtolite Occurrences-Connecticut: 690, 834, 846, 934, 939, 968.

CONNECTICUT (contd.)

Edwardsite Occurrences
See under individual county names and under Index III, Edwardsite Occurrences-Connecticut: 953, 956.

Fairfield County
Allanite Occurrences-
Brookfield: allanite: 968.
Greenwich-
Voorhis quarry at head of Byram Harbor: allanite as a fairly abundant accessory mineral in Greenwich blue-black granite:716,718.
Autunite Occurrences-
Branchville: autunite: 976,1098; autunite, columbite, cyrtolite, gummite, microlite, torbernite, uraconite, uraninite: 968; quarry with autunite as lemon-yellow scales or tiny plates coating uraninite or other minerals in pegmatite dikes; cyrtolite in deep brown crystals in pegmatite; microlite crystals in pegmatite; torbernite as emerald green micaceous flakes coating quartz and other minerals, especially uraninite and allanite, occurs here with uraninite; uraconite; uraninite: 934.
Redding (township)
Branchville mica mine: autunite, beryl, columbite-tantalite, cyrtolite, torbernite, uraninite, uranophane among rare and accessory minerals in pegmatite; geology, description: 690.
Cyrtolite Occurrences-
Branchville: autunite, columbite, cyrtolite, gummite, microlite, torbernite, uraconite, uraninite: 968; cyrtolite, rare: 834; cyrtolite, microlite, torbernite, uraninite: 846; quarry with autunite as lemon-yellow scales or tiny plates coating uraninite or other minerals in pegmatite dikes; cyrtolite in deep brown crystals in pegmatite; microlite crystals in pegmatite; torbernite

CONNECTICUT (contd.)

Fairfield County (contd.)
Cyrtolite Occurrences
Branchville:
as emerald green micaceous flakes coating quartz and other minerals, especially uraninite and allanite, occurs here with uraninite; uraconite; uraninite: 934.
Redding (township)
Branchville mica mine: autunite, beryl, columbite-tantalite, cyrtolite torbernite, uraninite, uranophane among rare and accessory minerals in pegmatite; geology, description: 690; uraninite, cyrtolite, and columbite in pegmatite but not likely in commercial amounts; geology and origin of pegmatite which occurs in amphibolite: 939; uraninite, age determinations gave a geologic age of about 368 m.y. or late Ordovician: 939.
Gummite Occurrences
Branchville: autunite, columbite, cyrtolite, gummite, microlite, torbernite, uraconite, uraninite: 968,1098.
Microlite Occurrences
Branchville: autunite, columbite, cyrtolite, gummite, microlite, torbernite, uraconite, uraninite: 968; cyrtolite, microlite, torbernite, uraninite: 846; quarry with autunite as lemon-yellow scales or tiny plates coating uraninite or other minerals in pegmatite dikes; cyrtolite in deep brown crystals in pegmatite; microlite crystals in pegmatite; torbernite as emerald green micaceous flakes coating

CONNECTICUT (contd.)

Fairfield County (contd.)

Microlite Occurrences

Branchville: quartz and other minerals, especially uraninite and allanite, occurs here with uraninite; uraconite; uraninite: 934.

Parathorite Occurrences

Danbury: parathorite, thorite: 968.

Pitchblende Occurrences

Branchville: pitchblende in Wilton: 1035; pitchblende: 1098.

Thorite Occurrences

Danbury: parathorite, thorite: 968; thorite associated with feldspar and danburite; mineralogy of thorite: 955.

Thorium Occurrences

Branchville: autunite, columbite, cyrtolite, gummite, microlite, torbernite, uraconite, uraninite: 968; cyrtolite, rare: 834; pitchblende in Wilton: 1035; quarry with autunite as lemon-yellow scales or tiny plates coating uraninite or other minerals in pegmatite dikes; cyrtolite in deep brown crystals in pegmatite; microlite crystals in pegmatite; torbernite as emerald green micaceous flakes coating quartz and other minerals, especially uraninite and allanite, occurs here with uraninite; uraconite; uraninite: 934; uraninite in albitic pegmatite: 916; uraninite in pegmatite vein: 839; uraninite, columbite in vein of albitic granite: 682; uraninite crystals in small vein in albite; a few crystals had yellow coating of uranium phosphate; chemical analyses showed U content to be 81.67 and 81.33 or a mean of 81.50 and a content of 40.08% UO_3 and 54.51% UO_2; description of methods used: 707; autunite, gummite, pitchblende, torbernite, uraninite: 1098;

CONNECTICUT (contd.)

Fairfield County (contd.)

Thorium Occurrences

Branchville: uraninite: 1100; uraninite, chemical analysis gave 85% UO_3 and UO_2, 7% ThO_2, and 4.35% PbO, but atomic weight of the lead was undetermined: 702; chemical analyses of uraninite gave respectively 74.77, 75.00, 74.26, 66, 81.67, and 81.33% U, 6.33, 6.09, 5.73% Th with no data from last 3 analyses, and ages of 370, 360, 370 (2 analyses), 340 (2 analyses) m.y.: 925; chemical analysis of uraninite specimens; uranium content as UO_2 for three specimens gave percentages of 84.78, 85.06, and 84.21; thoria content combined with other rare earth percentages, except for one specimen, gave percentages of: 7.20, 6.93 (only thoria), 6.52; material for these three analyses was the residue of that used by Comstock in making his analysis, which reported 40.08% UO_3, 54.51% UO_2, and no Th listing: 776; uraninite contained 74.3% U, 5.72% Th; geologic age 250 m.y. or 400 m.y. as calculated from lead ratio: 1036; uraninite samples studied to show the radium-uranium ratio in uranium minerals; determinations show 83.9% U in the uraninite, 0.0994 g U taken, 20.6 leak divisions per minute, and 207 as ratio leak to uranium; methods of testing and preparation of samples described in detail: 678; age determinations on uraninite gave 388 m.y. in three analyses: 747; age determinations made on monazite, containing no uranium,

CONNECTICUT (contd.)

Fairfield County (contd.)
Thorium Occurrences
Branchville:
and uraninite in Collins Hill quarry gave an age of 280-290 m.y. indicating that the pegmatites were injected during the Acadian revolution of late Devonian time and are younger than those at Branchville, where study of uraninite gave an age of about 380 m.y. or late Ordovician; description of methods used in making determinations: 755.
Fillow quarry: uraninite, average Pb/U ratio 0.052 and geologic age 383 m.y.: 948.
Brookfield: allanite: 968.
Danbury: parathorite, thorite: 968; thorite associated with feldspar and danburite; mineralogy of thorite: 955.
Greenwich
Voorhis quarry at head of Byram Harbor: allanite as a fairly abundant accessory mineral in Greenwich blue-black granite: 716, 718.
Redding (township)
Branchville mica mine: autunite, beryl, columbite-tantalite, cyrtolite, torbernite, uraninite, uranophane among rare and accessory minerals in pegmatite; geology, description: 690; uraninite, cyrtolite, and columbite in pegmatite but not likely in commercial amounts; geology and origin of pegmatite which occurs in amphibolite: 939; uraninite, age determinations give a geologic age of about 368 m.y. or late Ordovician: 939.

CONNECTICUT (contd.)

Fairfield County (contd.)
Torbernite Occurrences
Branchville: autunite, columbite, cyrtolite, gummite, microlite, torbernite, uraconite, uraninite: 968, 1098; cyrtolite, microlite, torbernite, uraninite: 846; quarry with autunite as lemon-yellow scales or tiny plates coating uraninite or other minerals in pegmatite dikes; cyrtolite in deep brown crystals in pegmatite; microlite crystals in pegmatite; torbernite as emerald green micaceous flakes coating quartz and other minerals, especially uraninite and allanite, occurs here with uraninite; uraconite; uraninite: 934.
Monroe (township)
East Village:
columbite, torbernite: 968; torbernite as emerald green micaceous flakes coating quartz and other minerals, especially uraninite and allanite, occurs here with columbite: 934.
Uraconite Occurrences
Branchville: autunite, columbite, cyrtolite, gummite, microlite, torbernite, uraconite, uraninite: 968; quarry with autunite as lemon-yellow scales or tiny plates coating uraninite or other minerals in pegmatite dikes; cyrtolite in deep brown crystals in pegmatite; microlite crystals in pegmatite; torbernite as emerald green micaceous flakes coating quartz and other minerals, especially uraninite and allanite, occurs here with uraninite; uraconite; uraninite: 934;

CONNECTICUT (contd.)

Fairfield County (contd.)

Uraconite Occurrences

Branchville:

uraconite; C. Frondel considers uraconite as "essentially a name with a mineral" stating that most specimens labelled uraconite in museum collections turn out to be zippeite or uranopilite: 758.

Uraninite Occurrences

Branchville: uraninite: 7, 78, 82, 1100; uraninite in albitic pegmatite: 916; uraninite in a pegmatite vein: 839; uraninite, columbite in vein of albitic granite: 682; autunite, columbite, cyrtolite, gummite, microlite, torbernite, uraconite, uraninite: 968, 1098; quarry with autunite as lemon-yellow scales or tiny plates coating uraninite or other minerals in pegmatite dikes; cyrtolite in deep brown crystals in pegmatite; microlite crystals in pegmatite; torbernite as emerald green micaceous flakes coating quartz and other minerals, especially uraninite and allanite, occurs here with uraninite; uraconite; uraninite: 934; cyrtolite, microlite, torbernite, uraninite: 846; uraninite crystals in small vein in albite; a few crystals had yellow coating of uranium phosphate; chemical analyses showed U content to be 81.67 and 81.33 or a mean of 81.50 and a content of 40.08% UO_3 and 54.51% UO_2; description of methods used: 707; chemical analyses of uraninite gave respectively 74.77, 75.00, 74.26, 66, 81.67, and 81.33% U, 6.33, 6.09, 5.73% Th with no data from last 3 analyses, and ages of 370, 360, 370 (2 analyses), 340 (2 analyses) m.y.: 925;

CONNECTICUT (contd.)

Fairfield County (contd.)

Uraninite Occurrences

Branchville:

uraninite, chemical analysis gave 85% UO_3 and UO_2, 7% ThO_2, and 4.35% PbO, but atomic weight of the lead was undetermined: 702; uraninite contained 74.3% U, 5.72% Th; geologic age 250 m.y. or 400 m.y. as calculated from lead ratio: 1036; chemical analysis of uraninite specimens; uranium content as UO_2 for three specimens gave percentages of 84.78, 85.06, and 84.21; thoria content combined with other rare earth percentages, except for one specimen, gave percentages of: 7.20, 6.93 (only thoria), 6.52; material for these three analyses was the residue of that used by Comstock in making his analysis, which reported 40.08% UO_3, 54.51% UO_2, and no Th listing: 776; uraninite samples studied to show the radium-uranium ratio in uranium minerals; determinations show 83.9% U in the uraninite, 0.0994 g. U taken, 20.6 leak divisions per minute, and 207 as ratio leak to uranium; methods of testing and preparation of samples described in detail: 678; age determinations on uraninite gave 388 m.y. in three analyses: 747; age determinations made on monazite, containing no uranium, and uraninite in Collins Hill quarry gave an age of 280-290 m.y. indicating that the pegmatites were injected during the Acadian revolution of late Devonian time and are younger than those at Branchville,

CONNECTICUT (contd.)

Fairfield County (contd.)
Uraninite Occurrences
Branchville:
where study of uraninite gave an age of about 380 m.y. or late Ordovician; description of methods used in making determinations: 755.
Fillow quarry: uraninite, average Pb/U ratio 0.052 and geologic age 383 m.y.: 948.
Redding (township)
Branchville mica mine: autunite, beryl, columbite-tantalite, cyrtolite, torbernite, uraninite, uranophane among rare and accessory minerals in pegmatite; geology, description: 690; uraninite, cyrtolite, and columbite in pegmatite but not likely in commercial amounts; geology and origin of pegmatite which occurs in amphibolite: 939; uraninite, age determinations give a geologic age of about 368 m.y. or late Ordovician: 939.

Uranium Occurrences
Branchville: autunite: 976; autunite, columbite, cyrtolite, gummite, microlite, torbernite, uraconite, uraninite: 968; cyrtolite, rare: 834; cyrtolite, microlite, torbernite, uraninite: 846; pitchblende in Wilton: 1035; quarry with autunite as lemon-yellow scales or tiny plates coating uraninite or other minerals in pegmatite dikes; cyrtolite in deep brown crystals in pegmatite; microlite crystals in pegmatite; torbernite as emerald green micaceous flakes coating quartz and other minerals, especially uraninite and allanite, occurs here with uraninite; uraconite; uraninite: 934; uraninite: 1100; autunite, columbite, gummite, pitchblende, torbernite, uraninite: 1098;

CONNECTICUT (contd.)

Fairfield County (contd.)
Uranium Occurrences
Branchville:
uraconite; C. Frondel considers uraconite as "essentially a name without a mineral" stating that most specimens labelled uraconite in museum collections turn out to be zippeite or uranopilite: 758; uraninite: 7, 78, 82; uraninite in a pegmatite vein: 839; uraninite in albitic pegmatite: 916; uraninite, columbite in vein of albitic granite: 682; uraninite crystals in small vein in albite; a few crystals had yellow coating of uranium phosphate; chemical analyses showed U content to be 81.67 and 81.33 or a mean of 81.50 and a content of 40.08% UO_3 and 54.51% UO_2; description of methods used: 707; uraninite contained 74.3% U, 5.72% Th; geologic age 250 m.y. or 400 m.y. as calculated from lead ratio: 1036; uraninite, chemical analysis gave 85% UO_3 and UO_2, 7% ThO_2, and 4.35% PbO, but atomic weight of the lead was undetermined: 702; chemical analysis of uraninite specimens; uranium content as UO_2 for three specimens gave percentages of 84.78, 85.06, and 84.21; thoria content combined with other rare earth percentages, except for one specimen, gave percentages of: 7.20, 6.93 (only thoria), 6.52; material for these three analyses was the residue of that used by Comstock in making his analysis, which reported 40.08% UO_3, 54.51% UO_2, and no Th listing: 776;

CONNECTICUT (contd.)

Fairfield County (contd.)
Uranium Occurrences
Branchville:
chemical analyses of uraninite gave respectively 74.77, 75.00, 74.26, 66, 81.67, and 81.33% U, 6.33, 6.09, 5.73% Th with no data from last 3 analyses, and ages of 370, 360, 370 (2 analyses), 340 (2 analyses) m.y.: 925; uraninite samples studied to show the radium-uranium ratio in uranium minerals; determinations show 83.9% U in the uraninite, 0.0994 g. U taken, 20.6 leak divisions per minute, and 207 as ratio leak to uranium; methods of testing and preparation of samples described in detail: 678; mineralogy of deposit: 7; age determinations on uraninite gave 388 m.y. in three analyses: 747; age determinations made on monazite, containing no uranium, and uraninite in Collins Hill quarry gave an age of 280-290 m.y. indicating that the pegmatites were injected during the Acadian revolution of late Devonian time and are younger than those at Branchville, where study of uraninite gave an age of about 380 m.y. or late Ordovician; description of methods used in making determinations: 755.
Fillow quarry: uraninite, average Pb/U ratio 0.052 and geologic age 383 m.y.: 948.
Danbury: parathorite, thorite: 968; thorite associated with feldspar and danburite; mineralogy of thorite: 955.
Monroe (township)
East Village: columbite, torbernite: 968; torbernite as emerald green micaceous flakes coating quartz and other minerals, especially uraninite and allanite, occurs here with columbite: 934.

CONNECTICUT (contd.)

Fairfield County (contd.)
Uranium Occurrences
Redding (township)
Branchville mica mine:
autunite, beryl, columbite-tantalite, cyrtolite, torbernite, uraninite, uranophane among rare and accessory minerals in pegmatite; geology, description: 690; uraninite, cyrtolite, and columbite in pegmatite but not likely in commercial amounts; geology and origin of pegmatite which occurs in amphibolite: 939; uraninite, age determinations give a geologic age of about 368 m.y. or late Ordovician: 939.

Uranophane Occurrences
Redding (township)
Branchville mica mine: autunite, beryl, columbite-tantalite, cyrtolite, torbernite, uraninite, uranophane among rare and accessory minerals in pegmatite: 690.

Gases, Thorium-bearing
See under individual county names and under Index III, Gases, Thorium-bearing-Connecticut: 933.

Gummite Occurrences
See under individual county names and under Index III, Gummite Occurrences-Connecticut: 788, 936, 968, 1098.

Hartford County
Allanite Occurrences
Glastonbury (township): allanite in long acicular crystals in pegmatite; xenotime in feldspar quarries: 934;

CONNECTICUT (contd.)

Hartford County (contd.)

Allanite Occurrences

Glastonbury (township):

allanite, autunite, columbite, monazite, torbernite, uraninite, uranophane, xenotime, yttrotantalite: 968.

Belden quarry on Eightmile Hill: allanite as an accessory in biotite granite gneiss: 716, 718.

Brooks quarry on NE side of Eightmile Hill: allanite as an accessory with some limonite staining, as minute spots, coming from the allanite: 716; allanite as an accessory in biotite granite gneiss like that in Corbin quarry: 718.

Carline quarry in village of Buckingham: allanite as an accessory in biotite granite gneiss: 718.

Corbin quarry at top of Birch Mountain: allanite, sometimes rimmed with epidote, as an accessory mineral in granite with some limonite staining, as minute spots, coming from allanite: 716; allanite as an accessory in biotite granite gneiss: 718.

Danielson quarry on S side of top of Eightmile Hill: allanite as an accessory in biotite granite gneiss: 716, 718.

Glastonbury Granite Works quarries near Buckingham: allanite as an accessory mineral in granite: 716.

Gorman quarry at foot of Birch Mountain: allanite as an accessory in biotite granite gneiss: 716, 718.

Husband quarry: torbernite as emerald green micaceous flakes coating quartz and other minerals, especially uraninite and allanite: 934.

North Killingworth: allanite: 968.

CONNECTICUT (contd.)

Hartford County (contd.)

Autunite Occurrences

Glastonbury (township):

allanite, autunite, columbite, monazite, torbernite, uraninite, uranophane, xenotime, yttrotantalite: 968; pegmatite veins include among their minerals columbite, samarskite, monazite, autunite, torbernite, uraninite: 916.

Monazite Occurrences

Glastonbury (township):

allanite, autunite, columbite, monazite, torbernite, uraninite, uranophane, xenotime, yttrotantalite: 968; pegmatite veins include among their minerals columbite, samarskite, monazite, autunite, torbernite, uraninite: 916.

**Radioactive Clay

Hartford: radioactivity studies of varves in clays showed that winter varves contained 1.5×10^{-12}g. Ra/g of dried varve while summer varves contained only about two-thirds as much; Ra content of summer varves increased with time while that of winter varves decreased; annual weighted Ra content for entire year appears to be nearly constant when calculated in g Ra/cc wet clay: 932.

East Windsor Hill, Hartford:

a) radioactivity studies made on six varved clays in this area; description of methods and apparatus used; radium content of summer deposit in varves varied from 0.87 ± 0.01 to $1.04 \pm 0.02 \times 10^{-12}$g Ra/g in dried clay and

**Pitchblende Occurrences-

Glastonbury (township): columbite, pitchblende, uraninite: 1098.

CONNECTICUT (contd.)

Hartford County (contd.)
Radioactive Clay
Hartford
East Windsor Hill, Hartford: 1.12 to 1.28 x 10^{-12}g Ra/cc in original clay; radium content of winter deposit in varves varied from 1.49 ± 0.01 to 1.71 ± 0.01 x 10^{-12}g Ra/g in dried clay and 1.40 to 1.62 x 10^{-12}g Ra/cc in original clay; radium content of dried clay from summer varves is only 2/3 or less of that of winter varves; weighted radium content for entire year for the six varves ranged from 1.33 to 1.40 g Ra/cc.: 993; b) radium content of winter deposit in varves appears to decrease with time while that of the summer deposit in varves seems to increase but total radium content of any varve appears to remain practically constant: 993; c) tentative age of Hartford clay, based on varve 3700, appears to be about 18000 years; more definite age information might be obtained by making similar studies of absolute age on clays at St. Johnsbury, Vermont, and in Scandinavia: 993.

Radioactivity Determinations
Radioactive Clay
Hartford: radioactivity studies of varves in clays showed that winter varves contained 1.5 x 10^{-12}g. Ra/g of dried varve while summer varves contained only about two-thirds as much; Ra content of summer varves increased with time while that of winter varves decreased; annual weighted Ra content for entire year appears to be nearly constant when calculated in g Ra/cc wet clay: 932.

CONNECTICUT (contd.)

Hartford County (contd.)
Radioactive Clay
Hartford
East Windsor Hill, Hartford: a) radioactivity studies made on six varved clays in this area; description of methods and apparatus used; radium content of summer deposit in varves varied from 0.87 ± 0.01 to 1.04 ± 0.02 x 10^{-12}g Ra/g in dried clay and 1.12 to 1.28 x 10^{-12}g Ra/cc in original clay; radium content of winter deposit in varves varied from 1.49 ± 0.01 to 1.71 ± 0.01 x 10^{-12}g Ra/g in dried clay and 1.40 to 1.62 x 10^{-12}g Ra/cc in original clay; radium content of dried clay from summer varves is only 2/3 or less of that of winter varves; weighted radium content for entire year for the six varves ranged from 1.33 to 1.40 g Ra/cc: 993; b) radium content of winter deposit in varves appears to decrease with time while that of the summer deposit in varves seems to increase but total radium content of any varve appears to remain practically constant; c) tentative age of Hartford clay, based on varve 3700, appears to be about 18000 years; more definite age information might be obtained by making similar studies of absolute age on clays at St. Johnsbury, Vermont, and in Scandinavia: 993.

CONNECTICUT (contd.)

Hartford County (contd.)
Samarskite Occurrences
Glastonbury (township)
General: pegmatite veins include among their minerals columbite, samarskite, monazite, autunite, torbernite, uraninite: 916; samarskite in pegmatites: 883; spectrographic analysis of samarskite gave 6.91% U, 3.05% Th, and 0.314% Pb: 881.
Spinelli pegmatite in East Glastonbury: samarskite; analysis of samarskite crystal indicated an age of 260 m.y.: 754.
Spinelli pegmatite quarry: samarskite in pegmatites intruding Glastonbury gneiss; age determinations on samarskite make it approximately 260 m.y. old and place the intrusion of the pegmatite in middle or late Paleozoic, probably near the beginning of the Mississippian: 706; samarskite, two chemical analyses gave 8.0% UO_2 and 3.62% ThO_2, and 7.70% UO_2 and 3.32% ThO_2 respectively, the mean being 7.85% UO_2 or 6.91% U and 3.47% ThO_2 or 3.05% Th; geologic age, 289 m.y.: 1012; samarskite, average Pb/U ratio 0.039 and geologic age 291 m.y.: 948; chemical analyses of samarskite gave mean values of 3.05% Th, 6.91% U and a preliminary age of 280 m.y.: 925.
Spinelli prospect: samarskite as an accessory mineral in pegmatite; geology, description: 690.
South Glastonbury: samarskite, uraninite: 968.
Thorium Occurrences
Glastonbury (township)
General: allanite in long acicular crystals in pegmatite; xenotime in feldspar quarries: 934; allanite, autunite, columbite, monazite, torbernite,

CONNECTICUT (contd.)

Hartford County (contd.)
Thorium Occurrences
Glastonbury (township)
General: uraninite, uranophane, xenotime, yttrotantalite: 968; pegmatite veins include among their minerals columbite, samarskite, monazite, autunite, torbernite, uraninite: 916; pitchblende: 1098; samarskite in pegmatites: 883; age determinations by various methods gave the following results: 253 m.y., RaG/U I; 266 m.y., ThD/Th; 280 +- 60, AcD/RaG.: 881; spectrographic analysis of samarskite gave 6.91% U, 3.05% Th, and 0.314% Pb: 881.
Belden quarry on Eightmile Hill: allanite as an accessory in biotite granite gneiss: 716, 718.
Brooks quarry on NE side of Eightmile Hill: allanite as an accessory mineral with some limonite staining, as minute spots, coming from the allanite: 716; allanite as an accessory in biotite granite gneiss, like that in Corbin quarry: 718.
Carline quarry in village of Buckingham: allanite as an accessory in biotite granite gneiss: 718.
Corbin quarry at top of Birch Mountain: allanite, sometimes rimmed with epidote, as an accessory mineral in granite with some limonite staining, as minute spots, coming from allanite: 716; allanite as an accessory in biotite granite gneiss: 718.

CONNECTICUT (contd.)

Hartford County (contd.)
Thorium Occurrences
Glastonbury (township)
Danielson quarry on S side of top of Eightmile Hill: allanite as an accessory in biotite granite gneiss: 716, 718.
Glastonbury Granite Works quarries near Buckingham: allanite as an accessory mineral in granite: 716.
Gorman quarry at foot of Birch Mountain: allanite as an accessory in biotite granite gneiss: 716, 718.
Husband quarry: torbernite as emerald green micaceous flakes coating quartz and other minerals, especially uraninite and allanite: 934.
Spinelli pegmatite in East Glastonbury: samarskite; analysis of samarskite crystal indicated an age of 260 m.y.: 754.
Spinelli quarry: samarskite in pegmatites intruding Glastonbury gneiss; age determinations on samarskite make it approximately 260 m.y. old and place the intrusion of the pegmatite in middle or late Paleozoic, probably near the beginning of the Mississippian: 706; samarskite, two chemical analyses gave 8.00% UO_2 and 3.62% ThO_2, and 7.70% UO_2 and 3.32% ThO_2 respectively, the mean being 7.85% UO_2 or 6.91% U and 3.47% ThO_2 or 3.05% Th; geologic age, 289 m.y.: 1012; chemical analyses of samarskite gave mean values of 3.05% Th, 6.91% U and a preliminary age of 280 m.y.: 925; samarskite, average Pb/U ratio 0.039 and geologic age 291 m.y.: 948.

CONNECTICUT (contd.)

Hartford County (contd.)
Thorium Occurrences
Glastonbury (township)
Spinelli prospect: samarskite as an accessory mineral in pegmatite; geology, description: 690.
South Glastonbury: samarskite, uraninite: 968.
Torbernite Occurrences
Glastonbury (township)
General: pegmatite veins include among their minerals columbite, samarskite, monazite, autunite, torbernite, uraninite: 916; allanite, autunite, columbite, monazite, torbernite, uraninite, uranophane, xenotime, yttrotantalite: 968.
Husband quarry NE of Portland and S of Glastonbury: torbernite in pegmatite in Bolton schist: 753; torbernite as emerald green micaceous flakes coating quartz and other minerals, especially uraninite and allanite: 934.
Uraninite Occurrences
Glastonbury (township)
General: 1098; allanite, autunite, columbite, monazite, torbernite, uraninite, uranophane, xenotime, yttrotantalite: 968; pegmatite veins include among their minerals columbite, samarskite, monazite, autunite, torbernite, uraninite: 916.
Hall's Quarry at Glastonbury: uraninite: 7.
Husband quarry: torbernite as emerald green micaceous flakes coating quartz and other minerals, especially uraninite and allanite: 934.
South Glastonbury: samarskite, uraninite: 968.

CONNECTICUT (contd.)

Hartford County (contd.)
Uranium Occurrences
Glastonbury (township)
General: pitchblende, uraninite: 1098; allanite in long acicular crystals in pegmatite, xenotime in feldspar quarries: 934; allanite, autunite, columbite, monazite, torbernite, uraninite, uranophane, xenotime, yttrotantalite: 968; pegmatite veins include among their minerals columbite, samarskite, monazite, autunite, torbernite, uraninite: 916; samarskite in pegmatites: 883; age determinations by various methods gave the following results: 253 m.y., RaG/U I; 266 m.y., ThD/Th; 280 ± 60, AcD/RaG: 881; spectrographic analysis of samarskite gave 6.91% U, 3.05% Th, and 0.314% Pb: 881.
Hall's Quarry at Glastonbury: uraninite; mineralogy: 7.
Husband quarry NE of Portland and S of Glastonbury: torbernite in pegmatite in Bolton schist: 753; torbernite as emerald green micaceous flakes coating quartz and other minerals, especially uraninite and allanite: 934.
Spinelli pegmatite in East Glastonbury: samarskite; analysis of samarskite crystal indicated an age of 260 m.y.: 754.
Spinelli quarry in Glastonbury: samarskite in pegmatites intruding Glastonbury gneiss; age determinations on samarskite make it approximately 260 m.y. old and place the intrusion of the pegmatite in middle or late Paleozoic, probably near the beginning of the Mississippian: 706; chemical analyses of samarskite gave mean values of 3.05% Th, 6.91% U and a preliminary age of 280 m.y.: 925;

CONNECTICUT (contd.)

Hartford County (contd.)
Uranium Occurrences
Glastonbury (township)
Spinelli quarry: samarskite, average Pb/U ratio 0.039 and geologic age 291 m.y.: 948; samarskite, two chemical analyses gave 8.00% UO_2 and 3.62% ThO_2, and 7.70% UO_2 and 3.32% ThO_2 respectively, the mean being 7.85% UO_2 or 6.91% U and 3.47% ThO_2 or 3.05% Th; geologic age, 289 m.y.: 1012.
Spinelli prospect: samarskite as an accessory mineral in pegmatite; geology, description: 690.
South Glastonbury: samarskite, uraninite: 968.
Uranophane Occurrences
Glastonbury (township): allanite, autunite, columbite, monazite, torbernite, uraninite, uranophane, xenotime, yttrotantalite: 968.
Yttrotantalite Occurrences
Glastonbury (township): allanite, autunite, columbite, monazite, torbernite, uraninite, uranophane, xenotime, yttrotantalite: 968.
Xenotime Occurrences
Glastonbury (township): allanite in long acicular crystals in pegmatite; xenotime in feldspar quarries: 934; allanite, autunite, columbite, monazite, torbernite, uraninite, uranophane, xenotime, yttrotantalite: 968.

Johannite Occurrences
See under individual county names and under Index III, Johannite Occurrences-Connecticut: 955, 968.

CONNECTICUT (contd.)

Litchfield County
Allanite Occurrences
Cornwall (township)
Benedict quarry on N side of White Rock: allanite as an accessory mineral in granite: 716; allanite as an accessory mineral in biotite-muscovite granite gneiss: 718.
Mount Prospect complex near Bantam: allanite as an accessory mineral in the dioritic gneisses and the quartz monzonite porphyry: 689.
Norfolk (township)
Crissey quarry on SE side of Bald Mountain: allanite, rimmed with epidote, as an accessory mineral in granite: 716; allanite rimmed with epidote in a biotite-muscovite granite gneiss: 718.
Norfolk: allanite: 968.
Autunite Occurrences
Thomaston: autunite: 968; occasionally, autunite as lemon-yellow scales or tiny plates coating uraninite or other minerals in pegmatite dikes: 934.
Upper Merryall: autunite: 976; autunite, columbite, uraninite: 968.
Abandoned quarry 5 mi. N of New Milford S of Peet Hill: autunite as lemon-yellow scales or tiny plates coating uraninite or other minerals in pegmatite dikes; uraninite: 934; autunite, columbite, and gem stones: 737.
Monazite Occurrences
Litchfield: monazite in minute quantities: 950.
Watertown: monazite: 968; monazite (eremite) in albitic granite: 950.
Watertown, near the Naugatuck River: monazite: 1098.

CONNECTICUT (contd.)

Litchfield County (contd.)
Radioactive Gases
Radioactivity Determinations
New Milford: water from a spring about 1500 ft. deep was boiled so that gas in it was driven off and tested in an electroscope; normal airleak was found to be increased about 3 times but gas was very much diluted because of air spaces in the boiling apparatus so that the leak found does not represent the real activity of the gas as it comes from the water: 685.
Radioactive Rocks
Housatonic Highlands
Cornwall Bridge on Connecticut Highway 4, 1.8 mi. W of junction with U.S. Highway 7: gneiss and quartzite radioactive zone 4 ft. wide and parallel to bedding; radiometric and chemical analyses of quartzite sample from N side of road, 0.008% eU, 0.001% U, and 0.02% ThO_2, and of sample of quartz-biotite-feldspar gneiss, 0.013% eU, 0.001% U, and 0.048% ThO_2; radioactivity of rocks on S side of road, 0.005% eU: 842.
Kent on Connecticut Highway 341, 500 ft. W of Housatonic River: radioactive pegmatite and gneiss, with radioactivity being confined to small zones in quartzite and gneiss layers; radiometric and chemical analyses of sample from 4-ft. pegmatite zone in gneiss, 0.018% eU, 0.003% U, and 0.052% ThO_2, and of an impure quartzite sample, 0.008% eU, 0.002% U, and 0.022, 0.024% ThO_2, and of two samples of quartz-feldspar-biotite pegmatite, 0.018% and no eU, 0.003% U for both, and 0.052% ThO_2 for

CONNECTICUT (contd.)

Litchfield County (contd.)
Radioactive Rocks
Housatonic Highlands
Kent on Connecticut Highway 341, 500 ft. W of Housatonic River: first, and 0.036% ThO_2 and less than 0.01% V_2O_5 for second: 842.
Radioactive Waters
New Milford: water from deep well had radioactive properties: 1035; water from a spring about 1500 ft. deep was boiled so that gas in it was driven off and tested in an electroscope; normal air-leak was found to be increased about 3 times but gas was very much diluted because of air spaces in the boiling apparatus so that the leak found does not represent the real activity of the gas as it comes from the water: 685.
Radioactivity Determinations
Radioactive Gases
New Milford: water from a spring about 1500 ft. deep was boiled so that gas in it was driven off and tested in an electroscope; normal airleak was found to be increased about 3 times but gas was very much diluted because of air spaces in the boiling apparatus so that the leak found does not represent the real activity of the gas as it comes from the water: 685.
Thorium Occurrences
Cornwall (township)
Benedict quarry on N side of White Rock: allanite as an accessory mineral in granite: 716; allanite as an accessory mineral in biotite-muscovite granite gneiss: 718.
Housatonic Highlands
Cornwall Bridge on Connecticut Highway 4, 1.8 mi. W of junction with U.S. Highway 7: gneiss and quartzite radioactive zone

CONNECTICUT (contd.)

Litchfield County (contd.)
Thorium Occurrences
Housatonic Highlands
Cornwall Bridge on Connecticut Highway 4, 1.8 mi. W of junction with U.S. Highway 7: 4 ft. wide and parallel to bedding; radiometric and chemical analyses of quartzite sample from N side of road, 0.008% eU, 0.001% U, and 0.02% ThO_2, and of sample of quartz-biotite-feldspar gneiss, 0.013% eU, 0.001% U, and 0.048% ThO_2; radioactivity of rocks on S side of road, 0.005% eU: 842.
Kent on Connecticut Highway 341, 500 ft. W of Housatonic River: radioactive pegmatite and gneiss, with radioactivity being confined to small zones in quartzite and gneiss, 0.018% eU, 0.003% U, and 0.052% ThO_2, and of an impure quartzite sample, 0.008% eU, 0.002% U, and 0.022, 0.024% ThO_2; and of two samples of quartz-feldspar-biotite pegmatite, 0.018% and no eU, 0.003% U for both, and 0.052% ThO_2 for first, and 0.036% ThO_2 and less than 0.01% V_2O_5 for second: 842.
Litchfield: monazite in minute quantities: 950.
Mount Prospect complex near Bantam: allanite as an accessory mineral in the dioritic gneisses and the quartz monzonite porphyry: 689.
Norfolk (township)
Crissey quarry on SE side of Bald Mountain: allanite, rimmed with epidote, as an accessory mineral in granite: 716; allanite rimmed with epidote in a biotite-muscovite granite gneiss: 718.
Norfolk: allanite: 968.
Upper Merryall: autunite, columbite, uraninite: 968.

CONNECTICUT (contd.)

Litchfield County (contd.)
Thorium Occurrences
Upper Merryall
Abandoned quarry 5 mi. N of New Milford S of Peet Hill: autunite as lemon-yellow scales or tiny plates coating uraninite or other minerals in pegmatite dikes; uraninite: 934.
Eureka mine in Merryall district 5 mi. N of New Milford: uraninite and columbite among minerals reported from this old surface mica mine now to be reopened: 1058.
Watertown: monazite: 968; monazite (eremite) in albitic granite: 950.
Watertown, near the Naugatuck River: monazite: 1098.
Torbernite Occurrences
Quarry at Flanders, 5 mi. N of Woodbury: good crystals of torbernite, columbite, and beryl: 737.
Woodbury: columbite, torbernite: 968.
Uraninite Occurrences
Thomaston: occasionally, autunite as lemon-yellow scales or tiny plates coating uraninite or other minerals in pegmatite dikes: 934.
Upper Merryall: autunite, columbite, uraninite: 968.
Abandoned quarry 5 mi. N of New Milford S of Peet Hill: autunite as lemon-yellow scales or tiny plates coating uraninite or other minerals in pegmatite dikes; uraninite: 934.
Eureka mine in Merryall district 5 mi. N of New Milford: uraninite and columbite among minerals reported from this old surface mica mine now to be reopened: 1058.

CONNECTICUT (contd.)

Litchfield County (contd.)
Uranium Occurrences
Housatonic Highlands
Cornwall Bridge on Connecticut Highway 4, 1.8 mi. W of junction with U.S. Highway 7: gneiss and quartzite radioactive zone 4 ft. wide and parallel to bedding; radiometric and chemical analyses of quartzite sample from N side of road, 0.008% eU, 0.001% U, and 0.02% ThO_2, and of sample of quartz-biotite-feldspar gneiss, 0.013% eU, 0.001% U, and 0.048% ThO_2; radioactivity of rocks on S side of road, 0.005% eU: 842.
Kent on Connecticut Highway 341, 500 ft. W of Housatonic River: radioactive pegmatite and gneiss, with radioactivity being confined to small zones in quartzite and gneiss layers; radiometric and chemical analyses of sample from 4-ft. pegmatite zone in gneiss, 0.018% eU, 0.003% U, and 0.052% ThO_2, and of impure quartzite sample, 0.008% eU, 0.002% U, and 0.022, 0.024% ThO_2; and of two samples of quartz-feldspar-biotite pegmatite, 0.018% and no eU, 0.003% U for both, and 0.052% ThO_2 for first, and 0.036% ThO_2 and less than 0.01% V_2O_5 for second: 842.
Quarry at Flanders, 5 mi. N of Woodbury: good crystals of torbernite, columbite, and beryl: 737.
Thomaston: autunite: 968; occasionally, autunite as lemon-yellow scales or tiny plates coating uraninite or other minerals in pegmatite dikes: 934.

CONNECTICUT (contd.)

Litchfield County (contd.)
Uranium Occurrences
Upper Merryall: autunite: 976; autunite, columbite, uraninite: 968.
Abandoned quarry 5 mi. N of New Milford S of Peet Hill: autunite as lemon-yellow scales or tiny plates coating uraninite or other minerals in pegmatite dikes; uraninite: 934; autunite, columbite, and gem stones: 737.
Eureka mine in Merryall district 5 mi. N of New Milford: uraninite and columbite among minerals reported from this old surface mica mine now to be reopened: 1058.
Woodbury: columbite, torbernite: 968.
Microlite Occurrences
See under individual county names and under Index III, Microlite Occurrences-Connecticut: 679, 725, 753, 754, 774, 792, 846, 915, 934, 968, 974, 1028, 1078, 1080.

Middlesex County
Allanite Occurrences
East Hampton: allanite, autunite: 968; allanite in long acicular crystals in pegmatite and, occasionally, autunite as lemon-yellow scales or tiny plates coating uraninite or other minerals in pegmatite dikes: 934.
Haddam: allanite in albite: 950; allanite, autunite, columbite, microlite, torbernite, uraninite: 968; allanite in small quantities at the epidote mine, autunite in minute quantities at several feldspar veins, accompanied by uran-mica; microlite found sparingly at the Gillette quarry; torbernite occurs sparingly at various feldspar deposits: 725.
Tims Hill locality S of Haddam: allanite in pegmatite at contact of Middletown series and Bolton schist: 753.

CONNECTICUT (contd.)

Middlesex County (contd.)
Allanite Occurrences
Haddam
Turkey Hill, west of: autunite as lemon-yellow scales or tiny plates coating uraninite or other minerals in pegmatite dikes; torbernite as emerald green micaceous flakes coating quartz and other minerals, especially uraninite and allanite: 934.
Haddam Neck
Quarry: allanite, autunite, columbite, microlite, monazite, samarskite, torbernite, uraninite from pegmatite veins: 915.
Rock Landing quarry: torbernite as emerald green micaceous flakes coating quartz and other minerals, especially uraninite and allanite: 934.
Killingworth: allanite: 968.
Middletown
Benvenue quarries 4½ mi. E of Middletown station S of the bend in the Connecticut River: allanite as an accessory mineral in the Maromas granite gneiss: 716, 718.
North Killingworth: allanite: 968.
North Killingworth on Essex turnpike where crossed by Hammonasset River: allanite in slender black prismatic crystals in granite gneiss: 949.
Portland: allanite in long acicular crystals in pegmatite, microlite in crystals in pegmatite, xenotime in feldspar quarries of area: 934; allanite, autunite, columbite, microlite, monazite, samarskite, torbernite, uraninite, uranite, xenotime: 968.

CONNECTICUT (contd.)

Middlesex County (contd.)
Allanite Occurrences
Portland
Collins Hill (or Strickland) quarry on W side of Collins Hill, 2½ mi. NE of Portland: pegmatite dikes with allanite, autunite, columbite, microlite, monazite, torbernite, uraninite, xenotime: 1028; allanite, autunite, columbite, microlite, monazite, samarskite, torbernite, uraninite from pegmatite veins: 915; autunite as lemon-yellow scales or tiny plates coating uraninite or other minerals in pegmatite dikes; monazite; torbernite as emerald green micaceous flakes coating quartz and other minerals, especially uraninite and allanite; uraninite: 934.
Hale (or Andrews) quarry near Portland: pegmatite with allanite as long, acicular crystals, autunite as flakes on smoky quartz, monazite as crystals 2-3 cm. in diameter, torbernite as small flakes on albite, microcline, muscovite, and smoky quartz, uraninite, xenotime: 1031; autunite as lemon-yellow scales or tiny plates coating uraninite or other minerals in pegmatite dikes; torbernite as emerald green micaceous flakes coating quartz and other minerals, especially uraninite and allanite: 934.
Autunite Occurrences
Chatham: pegmatite veins include among their minerals columbite, samarskite, monazite, autunite, torbernite, uraninite: 916.
East Hampton: allanite, autunite: 968; allanite in long acicular crystals in pegmatite and, occasionally, autunite as lemon-yellow scales or tiny plates coating uraninite or other minerals in pegmatite dikes: 934.

CONNECTICUT (contd.)

Middlesex County (contd.)
Autunite Occurrences
Haddam: allanite, autunite, columbite, microlite, torbernite, uraninite: 968; allanite in small quantities at the epidote mine, autunite in minute quantities at several feldspar veins, accompanied by uran-mica, microlite found sparingly at the Gillette quarry, torbernite occurs sparingly at various feldspar deposits: 725; pegmatite veins include among their minerals columbite, samarskite, monazite, autunite, torbernite, uraninite: 916.
Abandoned quarry on land owned by Hazen near Haddam: small autunite plates in pegmatite in Middletown series: 753.
Allen's vein in gneiss quarries: allanite: 934.
Turkey Hill, west of: autunite as lemon-yellow scales or tiny plates coating uraninite or other minerals in pegmatite dikes; torbernite as emerald green micaceous flakes coating quartz and other minerals, especially uraninite and allanite: 934; autunite: 976.
Haddam Neck: autunite, columbite, gummite, microlite, torbernite, uraninite, uranophane: 968.
Quarry: allanite, autunite, columbite, microlite, monazite, samarskite, torbernite, uraninite from pegmatite veins: 915.
Rock Landing quarry: uraninite crystals surrounded by gummite, autunite as coating on quartz and uraninite, torbernite as a coating and seam filling: 788;

CONNECTICUT (contd.)

Middlesex County (contd.)
Autunite Occurrences
Haddam Neck
Rock Landing quarry:
broad autunite vein usually associated with equal parts of uranophane and some columbite in a pegmatite deposit: 836; uraninite, sometimes stained by autunite, associated with columbite: 897.
Middle Haddam: autunite, columbite, uranophane: 968.
Middletown: autunite, columbite, microlite, monazite, samarskite, uraninite, zircon among minerals in the pegmatites, which are usually found here in the Bolton schist and Middletown gneiss: 774; pegmatite veins include among their minerals columbite, samarskite, monazite, autunite, torbernite, uraninite: 916.
Toll Gate mine: autunite, columbite-tantalite, torbernite, among rare and accessory minerals in pegmatite; geology, description: 690.
Portland: allanite, autunite, columbite, microlite, monazite, samarskite, torbernite, uraninite, uranite, xenotime: 968; pegmatite veins include among their minerals columbite, samarskite, monazite, autunite, torbernite, uraninite: 916.
Collins Hill (or Strickland) quarry on W slope of Collins Hill, 2½ mi. NE of Portland station: autunite: 958; allanite, autunite, columbite, microlite, monazite, samarskite, torbernite, uraninite from pegmatite veins: 915; autunite, uraninite in pegmatite in Bolton schist: 753; autunite as lemon-yellow scales or tiny plates coating uraninite or other minerals in pegmatite dikes; monazite; torbernite as emerald green micaceous flakes

CONNECTICUT (contd.)

Middlesex County (contd.)
Autunite Occurrences
Portland
Collins Hill (or Strickland) quarry on W slope of Collins Hill, 2½ mi. NE of Portland station:
coating quartz and other minerals, especially uraninite and allanite; uraninite: 934; pegmatite, injected into Bolton schist, contains small amounts of columbite, uraninite, as euhedral crystals, autunite as scaly yellow fracture coatings on other minerals, possibly as a weathering product, microlite (?), torbernite, among many other minerals; geology; paragenesis; mineralization: 792; pegmatite dikes with allanite, autunite columbite, microlite, monazite, torbernite, uraninite, xenotime: 1028; euhedral crystals of uraninite on feldspar matrix, with secondary autunite and columbite: 926; autunite and uraninite in pegmatite; analysis of uraninite crystal indicated an age of 315 m.y.: 754.
Hale (or Andrews) quarry:
autunite: 976; autunite as lemon-yellow scales or tiny plates coating uraninite or other minerals in pegmatite dikes; torbernite as emerald green micaceous flakes coating quartz and other minerals, especially uraninite and allanite; monazite, uraninite: 934;

CONNECTICUT (contd.)

Middlesex County (contd.)
Autunite Occurrences
Portland
Hale quarry: pegmatite deposits with heavy torbernite coatings on some specimens, autunite often occurring as rings of flakes around a center of uraninite or some other non-fluorescent mineral, and uranophane occasionally occurring with autunite: 836; autunite, torbernite in coarse granite: 912; pegmatite with allanite as long, acicular crystals, autunite as flakes on smoky quartz, monazite as crystals 2-3 cm. in diameter, torbernite as small flakes on albite, microcline, muscovite, and smoky quartz, uraninite, xenotime: 1031; torbernite, autunite, monazite, and uraninite in pegmatite; analyses of monazite and uraninite crystals indicated an age of 300 m.y.: 754.
Strickland and Cramer mines: autunite, beryl, columbite-tantalite, uraninite, uranophane among rare and accessory minerals in pegmatite; geology, description: 690.
Columbite, Thorium-bearing
Portland: columbite showed neither fluorescence nor phosphorescence under ultra-violet light, although samples of Th and Zr dioxides, of which this mineral contains some, did show phosphorescence: 652.
Columbite, Uranium-bearing
Middletown: mineral named torrelite by Thomson in honor of the scientist, Torrey, not believed by Dana to be a new mineral but really columbite, which usually was associated with or had coatings of uranite in this locality; physical, chemical, and optical

CONNECTICUT (contd.)

Middlesex County (contd.)
Columbite, Uranium-bearing
Middletown:
properties of the mineral agreed with those found elsewhere for columbite: 721.
Edwardsite Occurrences
Chester on Connecticut River: single crystal of edwardsite found; physical, chemical, and optical properties seem to be the same as those of monazite except that edwardsite contains Zr where monazite contains Th although newer chemical analyses seem to indicate some Th content in edwardsite: 956.
Gummite Occurrences
Haddam Neck: autunite, columbite, gummite, microlite, torbernite, uraninite, uranophane: 968.
Rock Landing Quarry: uraninite crystals surrounded by gummite, autunite as coating on quartz and uraninite, torbernite as a coating and seam filling: 788.
Portland
Collins Hill (or Strickland) quarry: dump had some specimens of uraninite occasionally coated with gummite; quarry submerged: 936.
Johannite Occurrences
Middletown, China-stone quarry 2 mi. from: pitchblende, embedded in feldspar, uranochre, uranium carbonate, johannite: 955, 968.
Microlite Occurrences
Haddam: microlite crystals in pegmatite: 934; allanite, autunite, columbite, microlite, torbernite, uraninite: 968; allanite in small quantities at the epidote mine, autunite in minute quantities at

CONNECTICUT (contd.)

Middlesex County (contd.)
Microlite Occurrences
Haddam:
several feldspar veins, accompanied by uran-mica, microlite found sparingly at the Gillette quarry, torbernite occurs sparingly at various feldspar deposits: 725
Haddam Neck:
microlite in pink beryl or albite "sparingly associated with other minerals"; columbite in small, well-defined crystals; paragenesis of the pegmatites containing minerals: 679; microlite crystals in pegmatite: 934; autunite, columbite, gummite, microlite, torbernite, uraninite, uranophane: 968.
Gillette quarry: microlite: 754; microlite on dumps: 1078; pegmatite dikes in gneiss and schist, those in schist containing columbite, microlite, torbernite, uraninite, and many other minerals: 974; microlite crystals in smoky quartz: 1080.
Quarry: allanite, autunite, columbite, microlite, monazite, samarskite, torbernite, uraninite from pegmatite veins: 915.
Middletown: microlite crystals in pegmatite: 934; autunite, columbite, microlite, monazite, samarskite, uraninite, zircon among minerals in the pegmatites, which are usually found here in the Bolton schist and Middletown gneiss: 774; columbite, johannite, microlite, samarskite, uraconite, uraninite, uranite: 968.
White Rocks Ridge, Quarry E of: microlite and uraninite in odd varieties of pegmatite types in Bolton schist: 753.

CONNECTICUT (contd.)

Middlesex County (contd.)
Microlite Occurrences
Portland: allanite in long acicular crystals in pegmatite, microlite in crystals in pegmatite, xenotime in feldspar quarries of area: 934; allanite, autunite, columbite, microlite, monazite, samarskite, torbernite, uraninite, uranite, xenotime: 968.
Collins Hill (or Strickland) quarry on W side of Collins Hill, 2½ mi. NE of Portland: pegmatite dikes with allanite, autunite, columbite, microlite, monazite, torbernite, uraninite, xenotime: 1028; allanite, autunite, columbite, microlite, monazite, samarskite, torbernite, uraninite from pegmatite veins: 915; pegmatite, injected into Bolton schist, contains small amounts of columbite, uraninite, as euhedral crystals, autunite as scaly yellow fracture coatings on other minerals, possibly as a weathering product, microlite (?), torbernite among many other minerals; geology; paragenesis; mineralization: 792.
Monazite Occurrences
Chatham: pegmatite veins include among their minerals columbite, samarskite, monazite, autunite, torbernite, uraninite: 916.
Chester: monazite: 968; monazite, rare, in gneiss: 934; monazite and sillimanite associated: 960.
Haddam: pegmatite veins include among their minerals columbite, samarskite, monazite, autunite, torbernite, uraninite: 916.

CONNECTICUT (contd.)

Middlesex County (contd.)
Monazite Occurrences
Haddam Neck
Quarry: allanite, autunite, columbite, microlite, monazite, samarskite, torbernite, uraninite from pegmatite veins: 915.
Middletown: autunite, columbite, microlite, monazite, samarskite, uraninite, zircon among minerals in the pegmatites, which are usually found here in the Bolton schist and Middletown gneiss: 774; pegmatite veins include among their minerals columbite, samarskite, monazite, autunite, torbernite, uraninite: 916.
Portland: allanite, autunite, columbite, microlite, monazite, samarskite, torbernite, uraninite, uranite, xenotime: 968; pegmatite veins include among their minerals columbite, samarskite, monazite, autunite, torbernite, uraninite: 916; monazite, uraninite: 1098.
Collins Hill (or Strickland) quarry on W slope of Collins Hill, 2½ mi. NE of Portland station: allanite, autunite, columbite, microlite, monazite, samarskite, torbernite, uraninite from pegmatite veins: 915; autunite as lemon-yellow scales or tiny plates coating uraninite or other minerals in pegmatite dikes; monazite; torbernite as emerald green micaceous flakes coating quartz and other minerals, especially uraninite and allanite; uraninite: 934; pegmatite dikes with allanite, autunite, columbite, microlite, monazite, torbernite, uraninite, xenotime: 1028; age determinations made on monazite, containing no uranium, and uraninite in Collins Hill quarry gave an age of 280-290 m.y.

CONNECTICUT (contd.)

Middlesex County (contd.)
Monazite Occurrences
Portland
Collins Hill (or Strickland) quarry on W slope of Collins Hill, 2½ mi. NE of Portland station: indicating that the pegmatites were injected during the Acadian revolution of late Devonian time and are younger than those at Branchville, where study of uraninite gave an age of about 380 m.y. or late Ordovician; description of methods used in making determinations: 755.
Hale (or Andrews) quarry: monazite: 82; monazite, uraninite: 78, 753; monazite, samarskite, and torbernite in granite vein: 914; autunite as lemon-yellow scales or tiny plates coating uraninite or other minerals in pegmatite dikes; monazite; uraninite: 934; autunite, monazite, and uraninite in pegmatite: 754; pegmatite reported to contain monazite, columbite, and uraninite among other minerals: 747; pegmatite with allanite as long, acicular crystals, autunite as flakes on smoky quartz, monazite as crystals 2-3 cm. in diameter, torbernite as small flakes on albite, microcline, muscovite, and smoky quartz, uraninite, xenotime: 1031; analysis of monazite gave 0.0186% PbO, 0.00% U_3O_8, and 8.52% ThO_2 or 0.1007% Pb, no U, 7.489% Th; age determinations based on Pb/Th content gave 277.9 m.y.: 747; analysis of uraninite by Hillebrand in 1889 showed 3.08% PbO, 23.03% UO_3, 59.93% UO_2, 10.01% ThO_2 or 2.859% Pb, 72.008% U, 8.799% Th; age determinations based

CONNECTICUT (contd.)

Middlesex County (contd.)
Monazite Occurrences
Portland
Hale (or Andrews) quarry: on U/Pb/Th content gave 282.9 m.y.: 747; uraninite, average Pb/U ratio 0.039 and geologic age 291 m.y.; monazite, average Pb/U ratio 0.037 and geologic age 276 m.y.: 948; chemical analysis of monazite gave 7.489% Th and age 300 m.y.; chemical analyses of uraninite gave 70.52, 70.59, 70.80, 72.68, and 72.02% U, 8.41, 8.60, 9.06, 8.61, and 8.80% Th, respectively and age of 280, 290, 270, 280, and 270 m.y.: 925; age determinations on monazite gave an age ratio of 0.037, with Pb 0.1007% and Thorium 7.48%; using Thorium factor 0.25 the result is 0.054 and Thorium factor 0.36, 0.074; the 0.36 factor agrees better with results of age determinations on uraninite from this same mine; similar value was reached with allanite from Blueberry Mountain, Massachusetts, pointing to a Devonian or more recent age: 827.
Hale-Walker prospect: beryl, rare occurrences of monazite, among rare and accessory minerals in pegmatite; geology, description: 690.
Pelton's quarry just E of Collins Hill: monazite, uraninite: 934; samarskite and monazite: 720.
Saybrook: monazite: 968.
Pitchblende Occurrences
Haddam: pitchblende in feldspar quarry: 1035.
Middletown: pitchblende: 1035; pitchblende, uranite, uranochre: 950; uraninite, pitchblende, columbite: 1098.
Middletown, China-stone quarry 2 mi. from: pitchblende embedded in feldspar, uranochre, uranium carbonate, johannite: 955;

CONNECTICUT (contd.)

Middlesex County (contd.)
Pitchblende Occurrences
Middletown, China-stone quarry 2 mi. from: pitchblende, uranium ochre of both green and yellow varieties, uranite, columbite present, associated with each other: 949.
Radioactive Columbite:
Haddam Neck
Rock Landing Quarry at East Haddam: radioactive columbite, showing an estimated U_3O_8 content of 0.5% by Geiger counter and spinthariscope methods; occurs in pegmatite from a section of the quarry where uraninite has been found, suggesting that radioactive columbite may serve as a guide to other radioactive minerals in pegmatite: 649.
Samarskite Occurrences
Chatham: pegmatite veins include among their minerals columbite, samarskite, monazite, autunite, torbernite, uraninite: 916.
Haddam: pegmatite veins include among their minerals columbite, samarskite, monazite, autunite, torbernite, uraninite: 916.
Haddam Neck
Quarry: allanite, autunite, columbite, microlite, monazite, samarskite, torbernite, uraninite from pegmatite veins: 915.
Middletown: autunite, columbite, microlite, monazite, samarskite, uraninite, zircon among minerals in the pegmatites, which are usually found here in the Bolton schist and Middletown gneiss: 774; columbite, johannite, microlite, samarskite, uraconite, uraninite, uranite: 968; pegmatite veins include among their minerals columbite, samarskite, monazite, autunite, torbernite, uraninite: 916.

CONNECTICUT (contd.)

Middlesex County (contd.)

Samarskite Occurrences

Portland: allanite, autunite, columbite, microlite, monazite, samarskite, torbernite, uraninite, uranite, xenotime: 968; pegmatite veins include among their minerals columbite, samarskite, monazite, autunite, torbernite, uraninite: 916.

Collins Hill (or Strickland) quarry on W slope of Collins Hill, 2½ mi. NE of Portland station: allanite, autunite, columbite, microlite, monazite, samarskite, torbernite, uraninite from pegmatite veins: 915.

Hale (or Andrews) quarry: monazite, samarskite, and torbernite in granite vein: 914.

Pelton's quarry just E of Collins Hill: samarskite in pegmatite in Glastonbury granite gneiss: 753; samarskite and monazite: 720; samarskite discovered by E. F. Sheldon: 913.

Thorium Occurrences

Chatham: pegmatite veins include among their minerals columbite, samarskite, monazite, autunite, torbernite, uraninite: 916.

Chester on Connecticut River: single crystal of edwardsite found; physical, chemical, and optical properties seem to be the same as those of monazite except that edwardsite contains Zr where monazite contains Th although newer chemical analyses seem to indicate some Th content in edwardsite: 956; monazite: 968; monazite, rare, in gneiss: 934; monazite and sillimanite associated: 960.

East Hampton: allanite, autunite: 968; allanite in long acicular crystals in pegmatite and, occasionally, autunite as lemon-yellow scales or tiny plates coating uraninite or other minerals in pegmatite dikes: 934.

CONNECTICUT (contd.)

Middlesex County (contd.)

Thorium Occurrences

Haddam: allanite in albite: 950; allanite, autunite, columbite, microlite, torbernite, uraninite: 968; allanite in small quantities at the epidote mine, autunite in minute quantities at several feldspar veins, accompanied by uran-mica, microlite found sparingly at the Gillette quarry, torbernite occurs sparingly at various feldspar deposits: 725; microlite crystals in pegmatite: 934; pegmatite veins include among their minerals columbite, samarskite, monazite, autunite, torbernite, uraninite: 916; pegmatite with uraninite and other minerals: 1053; pitchblende in feldspar quarry: 1035.

Allen's vein in gneiss quarries: allanite: 934.

Tims Hill locality S of Haddam: allanite in pegmatite at contact of Middletown series and Bolton schist: 753.

Turkey Hill, west of: autunite as lemon-yellow scales or tiny plates coating uraninite or other minerals in pegmatite dikes; torbernite as emerald green micaceous flakes coating quartz and other minerals, especially uraninite and allanite: 934.

Haddam Neck: autunite, columbite, gummite, microlite, torbernite, uraninite, uranophane: 968; microlite crystals in pegmatite: 934; microlite in pink beryl or albite "sparingly associated with other minerals"; columbite in small, well defined crystals; paragenesis of the pegmatites containing minerals: 679.

Gillette quarry: microlite crystals in smoky quartz: 1080.

CONNECTICUT (contd.)

Middlesex County (contd.)
Thorium Occurrences
Haddam Neck
Quarry: allanite, autunite, columbite, microlite, monazite, samarskite, torbernite, uraninite from pegmatite veins: 915.
Rock Landing quarry: torbernite as emerald green micaceous flakes coating quartz and other minerals, especially uraninite and allanite: 934; uraninite crystals surrounded by gummite, autunite as coating on quartz and uraninite, torbernite as a coating and seam filling: 788; chemical analysis of uraninite gave 76.60% U, 1.48% Th, and age of 280 m.y.: 925; uraninite, average Pb/U ratio 0.040 and geologic age 297 m.y.: 948.
Killingworth: allanite: 968.
Middletown: autunite, columbite, microlite, monazite, samarskite, uraninite, zircon among minerals in the pegmatites, which are usually found here in the Bolton schist and Middletown gneiss: 774; columbite, johannite, microlite, samarskite, uraconite, uraninite, uranite: 968; geologic map showing occurrences of pegmatites containing uraninite, columbite-tantalite, and other rare minerals: 977; microlite crystals in pegmatite: 934; pegmatite veins include among their minerals columbite, samarksite, monazite, autunite, torbernite, uraninite: 916; pegmatites with uraninite and some other minerals: 1053; pitchblende: 1035; pitchblende, uranite, uranochre: 950; uraninite in feldspar quarry: 839.
Middletown, China-stone quarry 2 mi. from: pitchblende, embedded in feldspar, uranochre, uranium carbonate, johannite: 955; pitchblende, uranium ochre of both green and

CONNECTICUT (contd.)

Middlesex County (contd.)
Thorium Occurrences
Middletown, China-stone quarry 2 mi. from:
yellow varieties, uranite, columbite present, associated with each other: 949.
Benvenue quarries $4\frac{1}{2}$ mi. E of Middletown station S of the bend in the Connecticut River: allanite as an accessory mineral in the Maromas granite gneiss: 716, 718.
White Rocks, Pegmatite quarries at: uraninite and uranium-ochre reported as early as 1837: 754.
White Rocks Ridge, Quarry E of: microlite and uraninite in odd varieties of pegmatite types in Bolton schist: 753.
North Killingworth: allanite: 968.
North Killingworth on Essex turnpike where crossed by Hammonasset River: allanite in slender black prismatic crystals in granite gneiss: 949.
Portland: allanite in long acicular crystals in pegmatite, microlite in crystals in pegmatite, xenotime in feldspar quarries of area: 934; allanite, autunite, columbite, microlite, monazite, samarskite, torbernite, uraninite, uranite, xenotime: 968; columbite showed neither fluorescence nor phosphorescence under ultra-violet light, although samples of Th and Zr dioxides, of which this mineral contains some, did show phosphorescence: 652; pegmatite veins include among their minerals columbite, samarskite, monazite, autunite, torbernite, uraninite: 916; pegmatites with uraninite and other minerals: 1053; uraninite, monazite: 1098.

CONNECTICUT (contd.)

Middlesex County (contd.)
Thorium Occurrences
Portland
Collins Hill (or Strickland)
quarry on W slope of Collins Hill, 2½ mi. NE of Portland station: large open pit on lens of coarse pegmatite, the mammoth vein reaching an extreme width of 20 m. and including, among its minerals, uraninite in crystals and columbite: 941; allanite, autunite, columbite, microlite, monazite, samarskite, torbernite, uraninite from pegmatite veins: 915; autunite, uraninite in pegmatite in Bolton schist: 753; autunite as lemon-yellow scales or tiny plates coating uraninite or other minerals in pegmatite dikes; monazite; torbernite as emerald green micaceous flakes coating quartz and other minerals, especially uraninite and allanite; uraninite: 934; autunite and uraninite in pegmatite; analysis of uraninite crystal indicated an age of 315 m.y.: 754; pegmatites, injected into Bolton schist, contain small amounts of columbite, uraninite, as euhedral crystals, autunite as scaly yellow fracture coatings on other minerals, possibly as a weathering product, microlite (?), torbernite, among many other minerals; geology; paragenesis; mineralization: 792; pegmatite dikes with allanite, autunite, columbite, microlite, monazite, torbernite, uraninite, xenotime: 1028; uraninite crystals present at Collins Hill quarry in pegmatite enclosed in Bolton schist near contact with Monson granodiorite; similar crystals found in Bolton schist at Hale quarry: 755; euhedral crystals

CONNECTICUT (contd.)

Middlesex County (contd.)
Thorium Occurrences
Portland
Collins Hill (or Strickland)
quarry on W slope of Collins Hill, 2½ mi. NE of Portland station:
of uraninite on feldspar matrix, with secondary autunite and columbite: 926; uraninite, average Pb/U ratio 0.041 and geologic age 304 m.y.: 948; ratio of UO_2/UO_3, about the same in uraninite from Hale and Collins Hill quarries, but total amount of oxides was higher in Collins Hill quarry uraninite while total amount of Th oxides was higher in the Hale quarry uraninite; it had been suggested that Th content increased with distance from the contact but, since the Hale quarry crystals were not found in place, it cannot be determined if their higher Th content was related to this cause: 755; seven chemical analyses of uraninite gave respectively 80.14, 80.20, 78.86, 79.00, 78.81, 78.82, 78.71% U, 2.86, 3.17, 3.26, 3.19, 3.34, 2.28, 3.32% Th, and ages of 290, 280 (in 3 analyses), 300, 320, 300 m.y.; by another type of chemical analysis the results were 74.39% U, 2.88% Th, and an age of 270 m.y.: 925; three chemical analyses of uraninite from Collins Hill quarry gave respectively: 3.80, 2.59, and 3.78% ThO_2, 3.34, 2.28, and 3.32% Th, 67.13, 75.41, and 73.59% UO_2, 23.59, 14.83, and 16.62% UO_3, 78.81, 78.82, and 78.71% U, and 0.36, 0.28, and 0.36% rare earths: 755;

CONNECTICUT (contd.)

Middlesex County (contd.)
Thorium Occurrences
Portland
Collins Hill (or Strickland) quarry on W slope of Collins Hill, 2½ mi. NE of Portland station: five chemical analyses by Hillebrand of uraninite from the Hale quarry gave respectively: 59.13, 58.01, 59.31, 57.43, and 59.93% UO_2; 22.08, 23.35, 22.22, 26.48, and 23.03% UO_3; 9.57, 9.78, 10.31, 9.79, and 11.10% ThO_2 (including rare earths); 70.52, 70.59, 70.80, 72.68, and 72.02% U; and 8.41, 8.60, 9.06, 8.61, and 9.76% Th: 755; microanalysis of a uraninite crystal gave 0.36% rare earths, 3.80% ThO_2 (3.34% Th), 92.93% U_3O_8 (78.81% U), and Pb/U + 0.25 Th ratio, 0.0426: 827; age determinations made on monazite, containing no uranium, and uraninite in Collins Hill quarry gave an age of 280-290 m.y. indicating that the pegmatites were injected during the Acadian revolution of late Devonian time and are younger than those at Branchville, where study of uraninite gave an age of about 380 m.y. or late Ordovician; description of methods used in making determinations: 755.
Hale (or Andrews) quarry: autunite, monazite, and uraninite in pegmatite: 754; autunite as lemon-yellow scales or tiny plates coating uraninite or other minerals in pegmatite dikes; torbernite as emerald green micaceous flakes coating quartz and other minerals, especially uraninite and allanite; monazite; uraninite: 934; monazite: 82; monazite, uraninite: 78, 753; monazite, samarskite, and torbernite in granite vein: 914; uraninite: 1098;

CONNECTICUT (contd.)

Middlesex County (contd.)
Thorium Occurrences
Portland
Hale (or Andrews) quarry: pegmatite with allanite as long, acicular crystals, autunite as flakes on smoky quartz, monazite as crystals 2-3 cm. in diameter, torbernite as small flakes on albite, microcline, muscovite, and smoky quartz, uraninite, xenotime: 1031; pegmatite reported to contain monazite, columbite, and uraninite among other minerals: 747; pegmatite deposits with heavy torbernite coatings on some specimens, autunite often occurring as rings of flakes around a center of uraninite or some other non-fluorescent mineral, and uranophane occasionally occurring with autunite: 836; uraninite crystals present at Collins Hill quarry in pegmatite enclosed in Bolton schist near contact with Monson granodiorite; similar crystals found in Bolton schist at Hale quarry: 755; ratio of UO_2/UO_3, about the same in uraninite from Hale and Collins Hill quarries, but total amount of U oxides was higher in Collins Hill quarry uraninite while total amount of Th oxides was higher in the Hale quarry uraninite; it had been suggested that Th content increased with distance from the contact but, since the Hale quarry crystals were not found in place, it cannot be determined if their higher Th content was related to this cause: 755; analysis of uraninite by Hillebrand in 1889 showed 3.08% PbO, 23.03% UO_3, 59.93%

CONNECTICUT (contd.)

Middlesex County (contd.)
Thorium Occurrences
Portland
Hale (or Andrews) quarry: UO_2, 10.01% ThO_2 or 2.859% Pb, 72.008% U, 8.799% Th; age determinations based on U/Pb/Th content gave 282.9 m.y.: 747; analysis of monazite gave 0.0186% PbO, 0.00% U_3O_8 and 8.52% ThO_2 or 0.1007% Pb, no U, 7.489% Th; age determinations based on Pb/Th content gave 277.9 m.y.: 747; chemical analysis of monazite gave 7.489% Th and age 300 m.y.; chemical analyses of uraninite gave 70.52, 70.59, 70.80, 72.68, and 72.02% U, 8.41, 8.60, 9.06, 8.61, and 8.80% Th, respectively, and ages of 280, 290, 270, 280, and 270 m.y.: 925; five chemical analyses by Hillebrand of uraninite from Hale quarry gave respectively: 59.13, 58.01, 59.31, 57.43, and 59.93% UO_2; 22.08, 23.35, 22.22, 26.48, and 23.03% UO_3; 9.57, 9.78, 10.31, 9.79, and 11.10% ThO_2 (including rare earths); 70.52, 70.59, 70.80, 72.68, and 72.02% U; and 8.41, 8.60, 9.06, 8.61, and 9.76% Th: 755; chemical analysis of uraninite specimens; uranium content as UO_2 for five different specimens gave percentages of 79.98, 80.06, 80.29, 82.43, and 81.67, the latter being a mean percent between 81.59 and 81.75; thoria content combined with percentages for rare earths, except for one specimen, gave following percentages in corresponding order for U content given above: 9.57, 9.78, 10.31, 9.79 (only thoria), 11.10 as mean between 11.08 and 11.13: 776; three chemical analyses of uraninite from Collins Hill quarry gave respectively:

CONNECTICUT (contd.)

Middlesex County (contd.)
Thorium Occurrences
Portland
Hale (or Andrews) quarry: 3.80, 2.59, and 3.78% ThO_2, 3.34, 2.28, and 3.32% Th, 67.13, 75.41, and 73.59% UO_2, 23.59, 14.83, and 16.62% UO_3, 78.81, 78.82, and 78.71% U, and 0.36, 0.28, and 0.36% rare earths: 755; age determinations on monazite gave an age ratio of 0.037, with Pb 0.1007% and Th 7.489%; using Thorium factor 0.25 the result is 0.054 and Thorium factor 0.36, 0.074; the 0.36 0.074; the 0.36 factor agrees better with results of age determinations on uraninite from this same mine; similar value was reached with allanite from Blueberry Mountain, Massachusetts, pointing to a Devonian or more recent age: 827; age determinations seem to indicate that uraninite here is distinctly younger than that at Branchville, Connecticut, and the cyrtolite from Bedford, New York, which are judged to be about the same Precambrian age: 827; uraninite, average Pb/U ratio 0.039 and geologic age 291 m.y.; monazite, average Pb/U ratio 0.037 and geologic age 276 m.y.: 948.

Hale-Walker prospect: beryl, rare occurrences of monazite, among rare and accessory minerals in pegmatite; geology, description: 690.

Pelton's quarry just E of Collins Hill: samarskite in pegmatite in Glastonbury granite gneiss: 753; samarskite discovered by E. F. Sheldon: 913; samarskite and monazite: 720; monazite, uraninite: 934.

CONNECTICUT (contd.)

Middlesex County (contd.)
Thorium Occurrences
Portland
Strickland and Cramer mines: autunite, beryl, columbite-tantalite, uraninite, uranophane among rare and accessory minerals in pegmatite; geology, description: 690.
Saybrook: monazite: 968.
Columbite, Thorium-bearing
Portland: columbite showed neither fluorescence nor phosphorescence under ultraviolet light, although samples of Th and Zr dioxides, of which this mineral contains some, did show phosphorescence: 652.
Torbernite Occurrences
Chatham: pegmatite veins include among their minerals columbite, samarskite, monazite, autunite, torbernite, uraninite: 916
Haddam: allanite in small quantities at the epidote mine, autunite in minute quantities at several feldspar veins, accompanied by uran-mica; microlite found sparingly at the Gillette quarry; torbernite occurs sparingly at various feldspar deposits: 725; allanite, autunite, columbite, microlite, torbernite, uraninite: 968; pegmatite veins include among their minerals columbite, samarskite, monazite, autunite, torbernite, uraninite: 916.
Turkey Hill, west of: autunite as lemon-yellow scales or tiny plates coating uraninite or other minerals in pegmatite dikes; torbernite as emerald green micaceous flakes coating quartz and other minerals, especially uraninite and allanite: 934.
Haddam Neck: autunite, columbite, gummite, microlite, torbernite, uraninite, uranophane: 968.

CONNECTICUT (contd.)

Middlesex County (contd.)
Torbernite Occurrences
Haddam Neck
Gillette quarry: pegmatite dikes in gneiss and schist, those in schist containing columbite, microlite, torbernite, uraninite, and many other minerals: 974.
Quarry: allanite, autunite, columbite, microlite, monazite, samarskite, torbernite, uraninite from pegmatite veins: 915.
Rock Landing quarry: torbernite as emerald green micaceous flakes coating quartz and other minerals, especially uraninite and allanite: 934; uraninite crystals surrounded by gummite, autunite as coating on quartz and uraninite, torbernite as a coating and seam filling: 788.
Middletown: pegmatite veins include among their minerals columbite, samarskite, monazite, autunite, torbernite, uraninite: 916.
Toll Gate mine: autunite, columbite-tantalite, torbernite, among rare and accessory minerals in pegmatite; geology, description: 690.
Portland: allanite, autunite, columbite, microlite, monazite, samarskite, torbernite, uraninite, uranite, xenotime: 968; pegmatite veins include among their minerals columbite, samarksite, monazite, autunite, torbernite, uraninite: 916.
Collins Hill (or Strickland) quarry on W side of Collins Hill, 2½ mi. NE of Portland station: pegmatite dikes with allanite, autunite, columbite, microlite, monazite, torbernite, uraninite, xenotime: 1028;

CONNECTICUT (contd.)

Middlesex County (cont.)
Torbernite Occurrences
Portland
Collins Hill (or Strickland) quarry on W side of Collins Hill, 2½ mi. NE of Portland: autunite as lemon-yellow scales or tiny plates coating uraninite or other minerals in pegmatite dikes; monazite; torbernite as emerald green micaceous flakes coating quartz and other minerals, especially uraninite and allanite; uraninite: 934; allanite, autunite, columbite, microlite, monazite, samarskite, torbernite, uraninite from pegmatite veins:915; pegmatite, injected into Bolton schist, contains small amounts of columbite, uraninite, as euhedral crystals, autunite as scaly yellow fracture coatings on other minerals, possibly as a weathering product, microlite (?), torbernite, among many other minerals; geology; paragenesis; mineralization: 792.
Hale (or Andrews) quarry: autunite and torbernite in pegmatite: 754; autunite as lemon-yellow scales or tiny plates coating uraninite or other minerals in pegmatite dikes; torbernite as emerald green micaceous flakes coating quartz and other minerals, especially uraninite and allanite: 934; autunite, torbernite in coarse granite: 912; monazite, samarskite, and torbernite in granite vein: 914; pegmatite with allanite as long, acicular crystals, autunite as flakes on smoky quartz, monazite as crystals 2-3 cm. in diameter, torbernite as small flakes on albite, microcline, muscovite, and smoky quartz, uraninite, xenotime: 1031;

CONNECTICUT (contd.)

Middlesex County (contd.)
Torbernite Occurrences
Portland
Hale (or Andrews) quarry: pegmatite deposits with heavy torbernite coatings on some specimens, autunite often occurring as rings of flakes around a center of uraninite or some other non-fluorescent mineral, and uranophane occasionally occurring with autunite: 836.
Uraconite Occurrences
Middletown: uraconite; C. Frondel considers uraconite as "essentially a name without a mineral" stating that most specimens labelled uraconite in museum collections turn out to be zippeite or uranopilite: 758; columbite, johannite, microlite, samarskite, uraconite, uraninite, uranite: 968.
Uraninite Occurrences
Chatham: pegmatite veins include among their minerals columbite, samarksite, monazite, autunite, torbernite, uraninite: 916.
East Hampton: allanite in long acicular crystals in pegmatite and, occasionally, autunite as lemon-yellow scales or tiny plates coating uraninite or other minerals in pegmatite dikes: 934.
Haddam: allanite, autunite, columbite, microlite, torbernite, uraninite: 968; pegmatites with uraninite and other minerals: 1053; pegmatite veins include among their minerals columbite, samarskite, monazite, autunite, torbernite, uraninite: 916.
Turkey Hill, west of: autunite as lemon-yellow scales or tiny plates coating uraninite or other minerals in pegmatite dikes; torbernite as emerald green micaceous flakes coating quartz and

CONNECTICUT (contd.)

Middlesex County (contd.)
Uraninite Occurrences
Haddam
Turkey Hill, west of:
other minerals, especially uraninite and allanite: 934.
Haddam Neck: autunite, columbite, gummite, microlite, torbernite, uraninite, uranophane: 968.
Gillette quarry: pegmatite dikes in gneiss and schist, those in schist containing columbite, microlite, torbernite, uraninite, and many other minerals: 974; uraninite, columbite: 764.
Quarry: allanite, autunite, columbite, microlite, monazite, samarskite, torbernite, uraninite from pegmatite veins: 915.
Rock Landing quarry: uraninite, sometimes stained by autunite, associated with columbite: 897; torbernite as emerald green micaceous flakes coating quartz and other minerals, especially uraninite and allanite: 934; uraninite crystals surrounded by gummite, autunite as coating on quartz and uraninite, torbernite as a coating and seam filling: 788; chemical analysis of uraninite gave 76.60% U, 1.48% Th, and age of 280 m.y.: 925; uraninite, average Pb/U ratio 0.040 and geologic age 297 m.y.: 948.
Middletown: uraninite: 7; uraninite in feldspar quarry: 839; autunite, columbite, microlite, monazite, samarskite, uraninite, zircon among minerals in the pegmatites, which are usually found here in the Bolton schist and Middletown gneiss: 774; columbite, johannite, microlite, samarskite, uraconite, uraninite, uranite: 968; geologic map showing occurrences of pegmatites containing uraninite, columbite-tantalite, and other rare minerals: 977; uraninite, pitchblende,

CONNECTICUT (contd.)

Middlesex County (contd.)
Uraninite Occurrences
Middletown: columbite: 1098; pegmatites with uraninite and other minerals: 1053; pegmatite veins include among their minerals columbite, samarskite, monazite, autunite, torbernite, uraninite: 916.
White Rocks, Pegmatite quarries at: uraninite and uranium-ochre reported as early as 1837: 754.
White Rocks Ridge, Quarry E of: microlite and uraninite in odd varieties of pegmatite types in Bolton schist: 753.
Portland: allanite, autunite, columbite, microlite, monazite, samarskite, torbernite, uraninite, uranite, xenotime: 968; pegmatite veins include among their minerals columbite, samarskite, monazite, autunite, torbernite, uraninite: 916; pegmatites with uraninite and other minerals: 1053; uraninite: 1098.
Collins Hill (or Strickland) quarry on W slope of Collins Hill, 2½ mi. NE of Portland station: large open pit on lens of coarse pegmatite, the mammoth vein reaching an extreme width of 20 m. and including, among its minerals, uraninite in crystals and columbite: 941; uraninite: 78, 82; uraninite crystals present at Collins Hill quarry in pegmatite enclosed in Bolton schist near contact with Monson granodiorite; similar crystals found in Bolton schist at Hale quarry: 755; allanite, autunite, columbite, microlite, monazite, samarskite, torbernite, uraninite from pegmatite vein: 915; autunite as lemon-yellow scales or tiny plates coating uraninite or other minerals in pegmatite dikes; monazite;

CONNECTICUT (contd.)

Middlesex County (contd.)
Uraninite Occurrences
Portland
Collins Hill (or Strickland)
quarry on W slope of Collins Hill, 2½ mi. NE of Portland station:
torbernite as emerald green micaceous flakes coating quartz and other minerals, especially uraninite and allanite; uraninite: 934; autunite, uraninite in pegmatite in Bolton schist: 753; autunite and uraninite in pegmatite; analysis of uraninite crystals indicated an age of 315 m.y.: 754; pegmatite dikes with allanite, autunite, columbite, microlite, monazite, torbernite, uraninite, xenotime: 1028; pegmatite, injected into Bolton schist, contains small amounts of columbite, uraninite, as euhedral crystals, autunite as scaly yellow fracture coatings on other minerals, possibly as a weathering product, microlite (?), torbernite, among many other minerals; geology; paragenesis; mineralization: 792; uraninite, average Pb/U ratio 0.041 and geologic age 304 m.y.: 948; euhedral crystals of uraninite on feldspar matrix, with secondary autunite and columbite: 926; ratio of UO_2/UO_3, about the same in uraninite from Hale and Collins Hill quarries, but total amount of U oxides was higher in Collins Hill quarry uraninite while total amount of Th oxides was higher in the Hale quarry uraninite; it had been suggested that Th content increased with distance from the contact but, since the Hale quarry crystals were not found in place, it cannot be determined if their higher Th content was related to this cause: 755;

CONNECTICUT (contd.)

Middlesex County (contd.)
Uraninite Occurrences
Portland
Collins Hill (or Strickland)
quarry on W slope of Collins Hill, 2½ mi. NE of Portland station:
dump had some specimens of uraninite occasionally coated with gummite; quarry submerged: 936; three chemical analyses of uraninite from Collins Hill quarry gave respectively: 3.80, 2.59, and 3.78% ThO_2, 3.34, 2.28, and 3.32% Th, 67.13, 75.41, and 73.59% UO_2, 23.59, 14.83, and 16.62% UO_3, 78.81, 78.82, and 78.71% U, and 0.36, 0.28, and 0.36% rare earths: 755; five chemical analyses by Hillebrand of uraninite from the Hale quarry gave respectively: 59.13, 58.01, 59.31, 57.43, and 59.93% UO_2; 22.08, 23.35, 22.22, 26.48, and 23.03% UO_3; 9.57, 9.78, 10.31, 9.79, and 11.10% ThO_2 (including rare earths); 70.52, 70.59, 70.80, 72.68 and 72.02% U; and 8.41, 8.60, 9.06, 8.61, and 9.76% Th: 755; seven chemical analyses of uraninite gave respectively: 80.14, 80.20, 78.86, 79.00, 78.81, 78.82, 78.71% U, 2.86, 3.17, 3.26, 3.19, 3.34, 2.28, 3.32% Th, and ages of 290, 280 (in 3 analyses), 300, 320, 300 m.y.; by another type of chemical analysis the results were 74.39% U, 2.88% Th, and an age of 270 m.y.: 925; microanalysis of a uraninite crystal gave 0.36% rare earths, 3.80% ThO_2 (3.34% Th), 92.93% U_3O_8 (78.81% U), and Pb/U / 0.25 Th ratio, 0.0426: 827;

CONNECTICUT (contd.)

Middlesex County (contd.)
Uraninite Occurrences
Portland
Collins Hill (or Strickland) quarry on W slope of Collins Hill, 2½ mi. NE of Portland station: age determinations made on monazite, containing no uranium, and uraninite in Collins Hill quarry gave an age of 280-290 m.y. indicating that the pegmatites were injected during the Acadian revolution of late Devonian time and are younger than those at Branchville, where study of uraninite gave an age of about 380 m.y. or late Ordovician; description of methods used in making determinations: 755

Hale (or Andrews) quarry: uraninite: 82; monazite, uraninite: 78, 753; autunite as lemon-yellow scales or tiny plates coating uraninite or other minerals in pegmatite dikes; torbernite as emerald green micaceous flakes coating quartz and other minerals, especially uraninite and allanite; monazite; uraninite: 934; autunite, monazite, and uraninite in pegmatite; analyses of monazite and uraninite crystals indicated an age of 300 m.y.: 754; pegmatite with allanite as long, acicular crystals, autunite as flakes, monazite, torbernite, uraninite, xenotime: 1031; pegmatite deposits with heavy torbernite coatings on some specimens, autunite often occurring as rings of flakes around a center of uraninite or some other non-fluorescent mineral, and uranophane occasionally occurring with autunite: 836; uraninite: 1098;

CONNECTICUT (contd.)

Middlesex County (contd.)
Uraninite Occurrences
Portland
Hale (or Andrews) quarry: pegmatite reported to contain monazite, columbite, and uraninite among other minerals: 747; uraninite crystals present at Collins Hill quarry in pegmatite enclosed in Bolton schist near contact with Monson granodiorite; similar crystals found in Bolton schist at Hale quarry: 755; uraninite, average Pb/U ratio 0.039 and geologic age 291 m.y.; monazite, average Pb/U ratio 0.037 and geologic age 276 m.y.: 948; analysis of uraninite by Hillebrand in 1889 showed 3.08% PbO, 23.03% UO_3, 59.93% UO_2, 10.01% ThO_2 or 2.859% Pb, 72.008% U, 8.799% Th; age determinations based on U/Pb/Th content gave 282.9 m.y.: 747; analysis of monazite gave 0.0186% PbO, 0.00% U_3O_8, and 8.52% ThO_2 or 0.1007% Pb, no U, 7.489% Th; age determinations based on Pb/Th content gave 277.9 m.y.: 747; five chemical analyses by Hillebrand of uraninite from the Hale quarry gave respectively: 59.13, 58.01, 59.31, 57.43, and 59.93% UO_2; 22.08, 23.35, 22.22, 26.48, and 23.03% UO_3; 9.57, 9.78, 10.31, 9.79, and 11.10% ThO_2 (including rare earths); 70.52, 70.59, 70.80, 72.68, and 72.02% U; and 8.41, 8.60, 9.06, 8.61, and 9.76% Th: 755; chemical analysis of uraninite specimens; uranium content as UO_2 for five different specimens gave percentages of 79.98, 80.06, 80.29, 82.43, and 81.67, the latter being a mean percent between 81.59 and 81.75; thoria content combined with percentages

CONNECTICUT (contd.)

Middlesex County (contd.)
Uraninite Occurrences
Portland
Hale (or Andrews) quarry: for rare earths, except for one specimen, gave following percentages in corresponding order for U content given above: 9.57, 9.78, 10.31, 9.79 (only thoria), 11.10 as mean between 11.08 and 11.13: 776; chemical analyses of uraninite gave 70.52, 70.59, 70.80, 72.68, and 72.02% U, 8.41, 8.60, 9.06, 8.61, and 8.80% Th, respectively, and ages of 280, 290, 270, 280, and 270 m.y.: 925; three chemical analyses of uraninite from Collins Hill quarry gave respectively: 3.80, 2.59, and 3.78% ThO_2, 3.34, 2.28, and 3.32% Th, 67.13, 75.41, and 73.59% UO_2, 23.59, 14.83, and 16.62% UO_3, 78.81, 78.82, and 78.71% U, and 0.36, 0.28, and 0.36% rare earths: 755; ratio of UO_2/UO_3, about the same in uraninite from Hale and Collins Hill quarries, but total amount of U oxides was higher in Collins Hill quarry uraninite while total amount of Th oxides was higher in the Hale quarry uraninite; it had been suggested that Th content increased with distance from the contact but, since the Hale quarry crystals were not found in place, it cannot be determined if their higher Th content was related to this cause: 755; age determinations seem to indicate that uraninite here is distinctly younger than that at Branchville, Connecticut, and the crytolite from Bedford, New York, which are judged to be about the same Precambrian age: 827.
Pelton's quarry E of Collins Hill: monazite; uraninite: 934.

CONNECTICUT (contd.)

Middlesex County (contd.)
Uraninite Occurrences
Portland
Strickland and Cramer mines: autunite, beryl, columbite-tantalite, uraninite, uranophane among rare and accessory minerals in pegmatite; geology, description: 690.
Uranite Occurrences
Middletown: columbite, johannite, microlite, samarskite, uraconite, uraninite, uranite: 968; mineral named torrelite by Thomson in honor of the scientist, Torrey, not believed by Dana to be a new mineral but really columbite, which usually was associated with or had coatings of uranite in this locality; physical, chemical, and optical properties of the mineral agreed with those found elsewhere for columbite: 721; pitchblende, uranite, uranochre: 950; uranite with columbite: 662.
Middletown, China-stone quarry 2 mi. from: pitchblende, uranium ochre of both green and yellow varieties, uranite, columbite present, associated with each other: 949.
Middletown, Feldspar quarry 3 mi. from: columbite associated with uranite, apatite, and albite, the uranite coating fractured surfaces of the columbite: 794.
Portland: allanite, autunite, columbite, microlite, monazite, samarskite, torbernite, uraninite, uranite, xenotime: 968.
Collins Hill (or Strickland) quarry on W slope of Collins Hill $2\frac{1}{2}$ mi. NE of Portland station: uranite among many minerals in pegmatite dike in which quarry is opened: 709.

CONNECTICUT (contd.)

Middlesex County (contd.)
Uranium Occurrences
Chatham: pegmatite veins include among their minerals columbite, samarskite, monazite, autunite, torbernite, uraninite: 916.
East Hampton: allanite, autunite: 968; allanite in long acicular crystals in pegmatite and, occasionally, autunite as lemon-yellow scales or tiny plates coating uraninite or other minerals in pegmatite dikes: 934.
Haddam: allanite, autunite, columbite, microlite, torbernite, uraninite: 968; allanite in small quantities at the epidote mine, autunite in minute quantities at several feldspar veins accompanied by uranmica; microlite found sparingly at the Gillette quarry; torbernite occurs sparingly at various feldspar deposits: 725; microlite crystals in pegmatite: 934; pegmatites with uraninite and other minerals:1053; pegmatite veins include among their minerals columbite, samarskite, monazite, autunite, torbernite, uraninite: 916; pitchblende in feldspar quarry: 1035.
Abandoned quarry on land owned by Hazen near Haddam: small autunite plates in pegmatite in Middletown series: 753.
Allen's vein in gneiss quarries: allanite: 934.
Turkey Hill, west of: autunite as lemon-yellow scales or tiny plates coating uraninite or other minerals in pegmatite dikes; torbernite as emerald green micaceous flakes coating quartz and other minerals, especially uraninite and allanite: 934; autunite: 976.
Haddam Neck: autunite, columbite, gummite, microlite, torbernite, uraninite, uranophane: 968; microlite crystals in pegmatite: 934;

CONNECTICUT (contd.)

Middlesex County (contd.)
Uranium Occurrences
Haddam Neck:
microlite in pink beryl or albite "sparingly associated with other minerals"; columbite in small, well-defined crystals; paragenesis of the pegmatites containing minerals: 679.
Gillette quarry: microlite: 754; pegmatite dikes in gneiss and schist, those in schist containing columbite, microlite, torbernite, uraninite, and many other minerals: 974; microlite crystals in smoky quartz: 1080; uraninite, columbite: 764; microlite on dumps: 1078.
Quarry: allanite, autunite, columbite, microlite, monazite, samarskite, torbernite, uraninite from pegmatite veins: 915.
Rock Landing quarry: broad autunite vein usually associated with equal parts of uranophane and some columbite in a pegmatite deposit: 836; uraninite, average Pb/U ratio 0.040 and geologic age 297 m.y.: 948; uraninite crystals surrounded by gummite, autunite as coating on quartz and uraninite, torbernite as a coating and seam filling: 788; radioactive columbite, showing an estimated U_3O_8 content of 0.5% by Geiger counter and spinthariscope methods; occurs in pegmatite from a section of the quarry where uraninite has been found, suggesting that radioactive columbite may serve as a guide to other radioactive minerals in pegmatite: 649; torbernite as emerald green micaceous flakes coating quartz and other minerals, especially uraninite and allanite: 934;

CONNECTICUT (contd.)

Middlesex County (contd.)
Uranium Occurrences
Haddam Neck
Rock Landing quarry:
uraninite, sometimes stained by autunite, associated with columbite: 897; uraninite, average Pb/U ratio 0.040 and geologic age 297 m.y.: 948; chemical analysis of uraninite gave 76.60% U, 1.48% Th, and age of 280 m.y.: 925.
Middle Haddam: autunite, columbite, uranophane: 968.
Middletown: autunite, columbite, microlite, monazite, samarskite, uraninite, zircon among minerals in the pegmatites, which are usually found here in the Bolton schist and Middletown gneiss: 774; mineral names torrelite by Thomson in honor of the scientist, Torrey, not believed by Dana to be a new mineral but really columbite, which usually was associated with or had coatings of uranite in this locality; physical, chemical, and optical properties of the mineral agreed with those found elsewhere for columbite: 721; columbite, johannite, microlite, samarskite, uraconite, uraninite, uranite: 968; microlite crystals in pegmatite: 934; pegmatite veins include among their minerals columbite, samarskite, monazite, autunite, torbernite, uraninite: 916; pegmatites with uraninite and other minerals: 1053; pitchblende: 1035; pitchblende, uranite, uranochre: 950; uraninite in feldspar quarry: 839; uraconite; C. Frondel considers uraconite as "essentially a name without a mineral" stating that most specimens labelled uraconite in museum collections turn out to be zippeite or uranopilite: 758; uranite with columbite: 662; uraninite: 7; mineralogy of deposit: 7; uraninite, pitchblende, columbite: 1098;

CONNECTICUT (contd.)

Middlesex County (contd.)
Uranium Occurrences
Middletown:
geologic map showing occurrences of pegmatites containing uraninite, columbite-tantalite, and other rare minerals: 977.
Middletown, China-stone quarry 2 mi. from: pitchblende, embedded in feldspar, uranochre, uranium carbonate, johannite: 955; pitchblende, uranium ochre of both green and yellow varieties, uranite, columbite present, associated with each other: 949.
Middletown, Feldspar quarry 3 mi. from: columbite associated with uranite, apatite, and albite, the uranite coating fractured surfaces of the columbite: 794.
Toll Gate mine: autunite, columbite-tantalite, torbernite, among rare and accessory minerals in pegmatite; geology, description: 690.
White Rocks, Pegmatite quarries at: uraninite and uranium-ochre reported as early as 1837: 754.
White Rocks Ridge, Quarry E of: microlite and uraninite in odd varieties of pegmatite types in Bolton schist: 753.
Portland: allanite in long acicular crystals in pegmatite, microlite in crystals in pegmatite, xenotime in feldspar quarries of area: 934; allanite, autunite, columbite, microlite, monazite, samarskite, torbernite, uraninite, uranite, xenotime: 968; pegmatite veins include among their minerals columbite, samarskite, monazite, autunite, torbernite, uraninite: 916; pegmatites with uraninite and other minerals: 1053; uraninite, monazite: 1098.

CONNECTICUT (contd.)

Middlesex County (contd.)
Uranium Occurrences
Portland
Collins Hill (or Strickland)
quarry on W slope of Collins Hill, 2½ mi. NE of Portland station: large open pit on lens of coarse pegmatite, the mammoth vein reaching an extreme width of 20 m. and including, among its minerals, uraninite in crystals and columbite: 941; allanite, autunite, columbite, microlite, monazite, samarskite, torbernite, uraninite from pegmatite veins: 915; autunite: 958; autunite, uraninite in pegmatite in Bolton schist: 753; autunite as lemon-yellow scales or tiny plates coating uraninite or other minerals in pegmatite dikes; monazite; torbernite as emerald green micaceous flakes coating quartz and other minerals, especially uraninite and allanite; uraninite: 934; autunite and uraninite in pegmatite; analysis of uraninite crystal indicated an age of 315 m.y.: 754; dump had some specimens of uraninite occasionally coated with gummite; quarry submerged: 936; pegmatite dikes with allanite, autunite, columbite, microlite, monazite, torbernite, uraninite, xenotime: 1028; uranite among many minerals in pegmatite dike in which quarry is opened: 709; uraninite: 78, 82; uraninite, average Pb/U ratio 0.041 and geologic age 304 m.y.: 948; pegmatites, injected into Bolton schist, contain small amounts of columbite, uraninite, as euhedral crystals, autunite as scaly yellow fracture coatings on other minerals possibly as a weathering product, microlite(?), torbernite among many other minerals; geology; paragenesis; mineralization: 792;

CONNECTICUT (contd.)

Middlesex County (contd.)
Uranium Occurrences
Portland
Collins Hill (or Strickland)
quarry on W slope of Collins Hill, 2½ mi. NE of Portland station:
uraninite crystals present at Collins Hill quarry in pegmatite enclosed in Bolton schist near contact with Monson granodiorite; similar crystals found in Bolton schist at Hale quarry: 755; euhedral crystals of uraninite on feldspar matrix, with secondary autunite and columbite: 926; three chemical analyses of uraninite from Collins Hill quarry gave respectively: 3.80, 2.59, and 3.78% ThO_2, 3.34, 2.28, and 3.32% Th, 67.13, 75.41, and 73.59% UO_2, 23.59, 14.83, and 16,62% UO_3, 78.81, 78.82, and 78.71% U, and 0.36, 0.28, and 0.36% rare earths: 755; five chemical analyses by Hillebrand of uraninite from the Hale quarry gave respectively: 59.13, 58.01, 59.31, 57.43, and 59.93% UO_2; 22.08, 23.35, 22.22, 26.48, and 23.03% UO_3; 9.57, 9.78, 10.31, 9.79, and 11.10% ThO_2 (including rare earths); 70.52, 70.59, 70.80, 72.68 and 72.02% U; and 8.41, 8.60, 9.06, 8.61, and 9.76% Th: 755; seven chemical analyses of uraninite gave respectively 80.14, 80.20, 78.86, 79.00 78.81, 78.82, 78.71% U, 2.86, 3.17, 3.26, 3.19, 3.34, 2.28, 3.32% Th, and ages of 290, 280 (in 3 analyses), 300, 320, 300 m.y.; by another type of chemical analysis the results were 74.39% U, 2.88% Th, and an age of 270 m.y.: 925;

CONNECTICUT (contd.)

Middlesex County (contd.)
Uranium Occurrences
Portland
Collins Hill (or Strickland) quarry on W slope of Collins Hill, 2½ mi. NE of Portland station: ratio of UO_2/UO_3, about the same in uraninite from Hale and Collins Hill quarries, but total amount of U oxides was higher in Collins Hill quarry uraninite while total amount of Th oxides was higher in the Hale quarry uraninite; it had been suggested that Th content increased with distance from the contact but, since the Hale quarry crystals were not found in place, it cannot be determined if their higher Th content was related to this cause: 755; microanalysis of a uraninite crystal gave 0.36% rare earths, 3.80% ThO_2 (3.34% Th), 92.93% U_3O_8 (78.81% U), and Pb/U/ 0.25 Th ratio, 0.0426: 827; age determinations made on monazite, containing no uranium, and uraninite in Collins Hill quarry gave an age of 280-290 m.y. indicating that the pegmatites were injected during the Acadian revolution of late Devonian time and are younger than those at Branchville, where study of uraninite gave an age of about 380 m.y. or late Ordovician; description of methods used in making determinations: 755.
Hale (or Andrews) quarry: autunite: 976; autunite and torbernite in pegmatite, 754; autunite, torbernite in coarse granite: 912; autunite as lemon-yellow scales or tiny plates coating uraninite or other minerals in pegmatite dikes; torbernite as emerald green micaceous flakes coating quartz and other minerals, especially uraninite and allanite; monazite, uraninite: 934;

CONNECTICUT (contd.)

Middlesex County (contd.)
Uranium Occurrences
Portland
Hale (or Andrews) quarry: autunite, monazite, and uraninite in pegmatite; analyses of monazite and uraninite crystals indicated an age of 300 m.y.: 754; monazite, uraninite: 78, 753; monazite, samarskite, and torbernite in granite vein: 914; pegmatite deposits with heavy torbernite coatings on some specimens, autunite often occurring as rings of flakes around a center of uraninite or some other nonfluorescent mineral, and uranophane occasionally occurring with autunite: 836; pegmatite with allanite as long, acicular crystals, autunite as flakes on smoky quartz, monazite as crystals 2-3 cm. in diameter, torbernite as small flakes on albite, microcline, muscovite, and smoky quartz, uraninite, xenotime: 1031; pegmatite reported to contain monazite, columbite, and uraninite among other minerals: 747; uraninite: 82; uraninite, average Pb/U ratio 0.039 and geologic age 291 m.y.; monazite, average Pb/U ratio 0.037 and geologic age 276 m.y.: 948; chemical analysis of uraninite specimens; uranium content as UO_2 for five different specimens gave percentages of 79.98, 80.06, 80.29, 82.43, and 81.67, the latter being a mean percent between 81.59 and 81.75; thoria content combined with percentages for rare earths, except for one specimen, gave following percentages in corresponding order for U content given

CONNECTICUT (contd.)

Middlesex County (contd.)
Uranium Occurrences
Portland
Hale (or Andrews) quarry:
above: 9.57, 9.78, 10.31, 9.79 (only thoria), 11.10 as mean between 11.08 and 11.13: 776; analysis of uraninite by Hillebrand in 1889 showed 3.08% PbO, 23.03% UO_3, 59.93% UO_2, 10.01% ThO_2 or 2.859% Pb, 72.008% U, 8.799% Th; age determinations based on U/Pb/Th content gave 282.9 m.y.: 747; analysis of monazite gave 0.0186% PbO, 0.00% U_3O_8, and 8.52% ThO_2 or 0.1007% Pb, no U, 7.489% Th; age determinations based on Pb/Th content gave 277.9 m.y.: 747; uraninite crystals present at Collins Hill quarry in pegmatite enclosed in Bolton schist near contact with Monson granodiorite; similar crystals found in Bolton schist at Hale quarry: 755; three chemical analyses of uraninite from Collins Hill quarry gave respectively: 3.80, 2.59, and 3.78% ThO_2, 3.34, 2.28, and 3.32% Th, 67.13, 75.41, and 73.59% UO_2, 23.59, 14,83, and 16.62% UO_3, 78.81, 78.82, and 78.71% U, and 0.36, 0.28, and 0.36% rare earths: 755; five chemical analyses by Hillebrand of uraninite from the Hale quarry gave respectively: 59.13, 58.01, 59.31, 57.43, and 59.93% UO_2; 22.08, 23.35, 22.22, 26.48, and 23.03% UO_3; 9.57, 9.78, 10.31, 9.79, and 11.10% ThO_2 (including rare earths); 70.52, 70.59, 70.80, 72.68, and 72.02% U; and 8.41, 8.60, 9.06, 8.61, 9.76% Th: 755; chemical analysis of monazite gave 7.489% Th and age 300 m.y.; chemical analyses of uraninite gave 70.52, 70.59, 70.80, 72.68, and 72.02% U, 8.41, 8.60, 9.06, 8.61, and 8.80% Th, respectively and ages of 280, 290, 270, 280, and 270 m.y.: 925;

CONNECTICUT (contd.)

Middlesex County (contd.)
Uranium Occurrences
Portland
Hale (or Andrews) quarry:
above: ratio of UO_2/UO_3, about the same in uraninite from Hale and Collins Hill quarries, but total amount of U oxides was higher in Collins Hill quarry uraninite while total amount of Th oxides was higher in the Hale quarry uraninite; it had been suggested that Th content increased with distance from the contact but, since the Hale quarry crystals were not found in place, it cannot be determined if their higher Th content was related to this cause: 755; age determinations seem to indicate that uraninite here is distinctly younger than that at Branchville, Connecticut, and the cyrtolite from Bedford, New York, which are judged to be about the same Precambrian age: 827; uraninite: 1098.
Pelton's quarry just E of Collins Hill: samarskite in pegmatite in Glastonbury granite gneiss: 753; samarskite and monazite: 720; monazite; uraninite: 934; samarskite discovered by E. F. Sheldon: 913.
Strickland and Cramer mines: autunite, beryl, columbite-tantalite, uraninite, uranophane among rare and accessory minerals in pegmatite; geology, description: 690.
Columbite, Uranium-bearing
Middletown: mineral named torrelite by Thomson in honor of the scientist, Torrey, not believed by Dana to be a new mineral but really columbite, which usually was associated with or had coatings of uranite in this locality; physical, chemical, and optical properties

CONNECTICUT (contd.)

Middlesex County (contd.)
Uranium Occurrences
Columbite, Uranium-bearing
Middletown:
of the mineral agreed with those found elsewhere for columbite: 721.
Uranochre Occurrences
Middletown: pitchblende, uranite, uranochre: 950.
Middletown, China-stone quarry 2 mi. from: pitchblende embedded in feldspar, uranochre, uranium carbonate, johannite: 955; pitchblende, uranium ochre of both green and yellow varieties, uranite, columbite present associated with each other: 949.
White Rocks, Pegmatite quarries at: uraninite and uranium-ochre reported as early as 1837: 754.
Uranophane Occurrences
Haddam Neck: autunite, columbite, gummite, microlite, torbernite, uraninite, uranophane: 968.
Rock Landing quarry: broad autunite vein usually associated with equal parts of uranophane and some columbite in a pegmatite deposit: 836.
Middle Haddam: autunite, columbite, uranophane: 968.
Portland
Hale (or Andrews) quarry: pegmatite deposits with heavy torbernite coatings on some specimens, autunite often occurring as rings of flakes around a center of uraninite or some other non-fluorescent mineral, and uranophane occasionally occurring with autunite: 836.
Strickland and Cramer mines: autunite, beryl, columbite-tantalite, uraninite, uranophane among rare and accessory minerals in pegmatite; geology, description: 690.

CONNECTICUT (contd.)

Middlesex County (contd.)
Xenotime Occurrences
Portland: allanite in long acicular crystals in pegmatite, microlite in crystals in pegmatite, xenotime in feldspar quarries of area: 934; allanite, autunite, columbite, microlite, monazite, samarskite, torbernite, uraninite, uranite, xenotime: 968.
Collins Hill (or Strickland) quarry on W side of Collins Hill, 2½ mi. NE of Portland: pegmatite dikes with allanite, autunite, columbite, microlite, monazite, torbernite, uraninite, xenotime: 1028; pegmatite with allanite as long, acicular crystals, autunite as flakes on smoky quartz, monazite as crystals 2-3 cm. in diameter, torbernite as small flakes on albite, microcline, muscovite, and smoky quartz, uraninite, xenotime: 1031.

Monazite Occurrences
See under individual county names and under Index III, Thorium Occurrences-Connecticut: 78, 82, 104, 662, 690, 718, 720, 747, 753, 754, 755, 774, 820, 827, 837, 853, 914, 915, 916, 925, 934, 948, 950, 960, 968, 1028, 1031, 1098, 1105.

New Haven County
Air, Thorium-bearing
New Haven: radioactivity determinations made on air by suspension of six negatively charged wires in a wide zigzag between second story windows each sagging from the horizontal by different amounts to make the electrostatic field include as much surrounding air as possible; observations seemed to indicate that decaying activity on air wires was due to thorium and radium: 684;

CONNECTICUT (contd.)

New Haven County (contd.)
Air, Thorium-bearing
New Haven:
with a 3-hour exposure, 3-5% of total initial effect was due to thorium, the proportion depending on the ease with which emanations escape from the soil: 684; with a 12-hour exposure thorium activity is sometimes 15% of the whole and, with a long wire, its decay may be followed for several days; a small amount of additional more rapidly decaying activity may be present but experiments have not established this as yet: 684; radioactivity of rain and snow probably due solely to radium, the thorium effect being absent because rapid decay of the thorium emanation prevents its reaching, in appreciable quantities, the height at which raindrops are formed: 684.
Sloane Physical Laboratory in New Haven: determination of the amount of thorium emanation in underground air around the laboratory indicated thorium emanation equivalent to that produced, per cc of earth, by 1.35×10^{-6}g Th under standard conditions: 933; determination of the amount of radium emanation in underground air around the laboratory indicated that one cc. of underground air contains radium emanation equal to the amount in equilibrium with 2.4×10^{-13}g. Ra, or the equivalent of the production, per cc of earth, of radium emanation in equilibrium with 8.9×10^{-14}g. Ra: 933; average values found by Joly for thorium content of many common rocks equalled ten times the value for the earth at New Haven and for the radium content of these rocks, about one hundred times that for the earth at New Haven: 933; average of results of measurements at Montreal, Canada, on amount of radium emanation present per cc in atmospheric

CONNECTICUT (contd.)

New Haven County (contd.)
Air, Thorium-bearing
Sloane Physical Laboratory in New Haven:
air indicated the equivalent of that in equilibrium with 6×10^{-17} g. Ra or about one four-thousandth of the amount in underground air at New Haven: 933; results of studies of radioactive properties of soil and underground air in various localities may provide valuable data for explaining differences in radioactivity of the atmosphere already observed in certain instances: 933; full description of the methods and apparatus used: 933.
Allanite Occurrences
Branford
West quarry on Hoadley Neck:
allanite as accessory mineral in bands and dikes of fine gneiss: 716.
Southford, feldspar quarry southwest of, Oxford: torbernite as emerald green micaceous flakes coating quartz and other minerals especially uraninite and allanite: 934.
Gases, Thorium-bearing
Sloane Physical Laboratory in New Haven: determination of the amount of thorium emanation in underground air around the laboratory indicated thorium emanation, equivalent to that produced per cc. of earth, by 1.35×10^{-6}g. Th under standard conditions: 933.
Monazite Occurrences
Branford: monazite: 968.
Hoadley Point quarries: monazite in small brown or greyish brown crystals plentiful here: 934.

CONNECTICUT (contd.)

New Haven County (contd.)
Radioactive Air
Radioactivity Determinations
New Haven: radioactivity determinations made on air by suspension of six negatively charged wires in a wide zigzag between second story windows each sagging from the horizontal by different amounts to make the electrostatic field include as much surrounding air as possible; observations seemed to indicate that decaying activity on air wires was due to thorium and radium: 684; with a 3-hour exposure, 3-5% of total initial effect was due to thorium, the proportion depending on the ease with which emanations escape from the soil: 684; with a 12-hour exposure thorium activity is sometimes 15% of the whole and, with a long wire, its decay may be followed for several days; a small amount of additional more rapidly decaying activity may be present but experiments have not established this as yet: 684; radioactivity of rain and snow probably due solely to radium, the thorium effect being absent because rapid decay of the thorium emanation prevents its reaching, in appreciable quantities, the height at which raindrops are formed: 684.
Sloane Physical Laboratory in New Haven: determination of amount of radium emanation in underground air around the laboratory indicated that one cc. of underground air contains radium emanation equal to the amount in equilibrium with 2.4×10^{-13}g. Ra, or the equivalent of the production, per cc. of earth, of radium emanation in equilibrium with 8.9×10^{-14}g. Ra: 933;

CONNECTICUT (contd.)

New Haven County (contd.)
Radioactive Air
Radioactivity Determinations
Sloane Physical Laboratory in New Haven:
average values found by Joly for thorium content of many common rocks equalled ten times the value for the earth at New Haven and for the radium content of these rocks, about one hundred times that for the earth at New Haven: 933; average of results of measurements at Montreal, Canada, on amount of radium emanation present per cc. in atmospheric air indicated the equivalent of that in equilibrium with 6×10^{-17}g. Ra or about one four-thousandth of the amount in underground air at New Haven: 933; results of studies of radioactive properties of soil and underground air in various localities may provide valuable data for explaining differences in radioactivity of the atmosphere already observed in certain instances: 933; full description of the methods and apparatus used: 933.
Thorium Determinations
New Haven: radioactivity determinations made on air by suspension of six negatively charged wires in a wide zigzag between second story windows each sagging from the horizontal by different amounts to make the electrostatic field include as much surrounding air as possible; observations seemed to indicate that decaying activity on air wires was due to thorium and radium: 684; with a 3-hour exposure, 3-5% of total initial effect was due to thorium, the proportion depending on the

CONNECTICUT (contd.)

New Haven County (contd.)
Radioactive Air
Thorium Determinations
New Haven:
ease with which emanations escape from the soil: 684; with a 12-hour exposure thorium activity is sometimes 15% of the whole and, with a long wire, its decay may be followed for several days; a small amount of additional more rapidly decaying activity may be present but experiments have not established this as yet: 684; radioactivity of rain and snow probably due solely to radium, the thorium effect being absent because rapid decay of the thorium emanation prevents its reaching, in appreciable quantities, the height at which raindrops are formed: 684.
Sloane Physical Laboratory in New Haven: determination of the amount of thorium emanation in underground air around the laboratory indicated thorium emanation, equivalent to that produced, per cc. of earth, by 1.35×10^{-6}g. Th under standard conditions: 933; average values found by Joly for thorium content of many common rocks equalled ten times the value for the earth at New Haven and for the radium content of these rocks, about one hundred times that for the earth at New Haven: 933; full description of the methods and apparatus used: 933.
Radioactive Gases
Radioactivity Determinations
New Haven: water from a city reservoir, an artificial lake fed entirely by surface drainage, when tested was found to contain strongly active gas; 175 cc. of gas were obtained from 7.5 liters of the water and, when put into a 380 cc. Wilson electroscope,

CONNECTICUT (contd.)

New Haven County (contd.)
Radioactive Gases
Radioactivity Determinations
New Haven:
increased the normal air leak by 12 times, giving this same result whether the water came through city supply pipes or directly from the lake; when water from which this gas was expelled, was aerated by dropping, it did not recover the power to give off radioactive gas after 16 days, indicating that the gas is not an emanation from any radioactive substance dissolved in the water; this is also shown by the fact that residue from the water is very slightly, if at all, active: 685; gas from the ground, about 5 ft. deep, was taken for comparison with that in the water in an effort to explain the presence of gas in the water; gas from the ground was 3 times more radioactive but both followed the same pattern in the gradual loss of their radioactivity: 685; results of studies seem to indicate that the radioactive gases found in the surface water and in the ground near New Haven are identical with radium emanation and, if any other radioactive constituent is present, it can only be in very small proportion; density of the radium emanation is about four times that of carbon dioxide: 686; the fact that radioactivity of gas in water at Cambridge, Massachusetts, and in soils at various places in Germany, is also mainly due to radium emanation, may indicate that radium may be widely distributed in the earth although not always in the surface layers: 686;

CONNECTICUT (contd.)

New Haven County (contd.)
Radioactive Gases
Radioactivity Determinations
New Haven:
further studies on radioactive gas from surface water and from a few feet below the ground, both types apparently being identical with the gaseous emanation from radium discovered by Dorn; new investigations made to determine if these "natural" radioactive gases contained a small proportion of some active constituent besides radium by comparing them directly with the radium emanation; full description of methods and apparatus used in investigation: 686.
Sloane Physical Laboratory in New Haven: determination of amount of radium emanation in underground air around the laboratory indicated that one cc. of underground air contains radium emanation equal to the amount in equilibrium with 2.4×10^{-13}g. Ra, or the equivalent of the production, per cc. of earth, of radium emanation in equilibrium with 8.9×10^{-14}g. Ra: 933; determination of the amount of thorium emanation in underground air around the laboratory indicated thorium emanation, equivalent to that produced, per cc. of earth, by 1.35×10^{-6}g. Th under standard conditions: 933; average values found by Joly for thorium content of many common rocks equalled ten times the value for the earth at New Haven and for the radium content of these rocks, about one hundred times that for the earth at New Haven: 933; average of results of measurements at Montreal, Canada, on amount of radium emanation present per cc. in atmospheric air indicated the equivalent of that in equilibrium with 6×10^{-17}g. Ra or about one four-thousandth of the amount in underground air at New Haven: 933;

CONNECTICUT (contd.)

New Haven County (contd.)
Radioactive Gases
Radioactivity Determinations
Sloane Physical Laboratory in New Haven:
results of studies of radioactive properties of soil and underground air in various localities may provide valuable data for explaining differences in radioactivity of the atmosphere already observed in certain instances: 933; full description of the methods and apparatus used: 933.
Radioactive Rocks
Central New England Province
Branford, Area about 12 sq. mi. on U.S. Highway 1 and Connecticut Highways 142 and 143: radioactivity of medium-grained biotite granite in Branford granite gneiss, 0.004-0.006% eU; radiometric and chemical analyses of Branford granite gneiss sample, 0.005% eU and 0.001% and 0.005% U, taken at a point 12.8 mi. S of junction of U.S. Highway 1 and Connecticut Highway 79: 842.
North Guilford along Connecticut Highway 80: radioactivity of pegmatite, 100 ft. long, in Middletown gneiss, 0.005% eU: 842.
Radioactive Soil
Radioactivity Determinations
New Haven: radioactivity determinations on soil gave 8.9×10^{-14}g Ra/cc soil and 1.35×10^{-6}g Th/cc soil: 868; results of studies seem to indicate that the radioactive gases found in the surface water and in the ground near New Haven are identical with radium emanation and if any other radioactive constituent is present, it can only be in very small proportion; density of the radium emanation is about four times that of carbon dioxide: 686;

CONNECTICUT (contd.)

New Haven County (contd.)
Radioactive Soil
Radioactivity Determinations
New Haven:
further studies on radioactive gas from surface water and from a few feet below the ground, both types apparently being identical with the gaseous emanation from radium discovered by Dorn; new investigations made to determine if these "natural" radioactive gases contained a small proportion of some active constituent besides radium by comparing them directly with the radium emanation; full description of methods and apparatus used in investigation: 686; the fact that radioactivity of gas in water at Cambridge, Massachusetts, and in soils at various places in Germany, is also mainly due to radium emanation, may indicate that radium may be widely distributed in the earth although not always in the surface layers: 686; water from a city reservoir, an artificial lake fed entirely by surface drainage, when tested was found to contain strongly active gas; 175 cc. of gas were obtained from 7.5 liters of the water and, when put into a 380 cc. Wilson electroscope, increased the normal air leak by 12 times, giving this same result whether the water came through city supply pipes or directly from the lake; when water from which this gas was expelled, was aerated by dropping, it did not recover the power to give off radioactive gas after 16 days, indicating that the gas is not an emanation from any radioactive substance dissolved in the water; this is also shown by the fact that residue from the water is very slightly, if at all, active: 685;

CONNECTICUT (contd.)

New Haven County (contd.)
Radioactive Soil
Radioactivity Determinations
New Haven:
gas from the ground, about 5 ft. deep, was taken for comparison with that in the water in an effort to explain the presence of gas in the water; gas from the ground was 3 times more radioactive but both followed the same pattern in the gradual loss of their radioactivity: 685.

Sloane Physical Laboratory in New Haven: determination of amount of radium emanation in underground air around the laboratory indicated that one cc. of underground air contains radium emanation equal to the amount in equilibrium with 2.4 x 10^{-13}g. Ra, or the equivalent of the production, per cc. of earth, of radium emanation in equilibrium with 8.9 x 10^{-14}g. Ra: 933; average of results of measurements at Montreal, Canada, on amount of radium emanation present per cc. in atmospheric air indicated the equivalent of that in equilibrium with 6 x 10^{-17}g. Ra or about one four-thousandth of the amount in underground air at New Haven: 933; results of studies of radioactive properties of soil and underground air in various localities may provide valuable data for explaining differences in radioactivity of the atmosphere already observed in certain instances: 933; full description of the methods and apparatus used: 933.

CONNECTICUT (contd.)

New Haven County (contd.)
Radioactive Soil
Thorium Determinations
New Haven: radioactivity determinations on soil gave 8.9 x 10^{-14}g Ra/cc soil and 1.35 x 10^{-6}g Th/cc soil: 868.
Sloane Physical Laboratory in New Haven: determination of the amount of thorium emanation in underground air around the laboratory indicated thorium emanation, equivalent to that produced per cc. of earth by 1.35 x 10^{-6}g Th under standard conditions: 933; average value found by Joly for thorium content of many common rocks equalled ten times the value for the earth at New Haven and for the radium content of these rocks, about one hundred times that for the earth at New Haven: 933; full description of the methods and apparatus used: 933.
Radioactive Waters
Lake Saltonstall: lake water had radioactive properties: 1035.
Radioactivity Determinations
New Haven: water from a city reservoir, an artificial lake fed entirely by surface drainage, when tested was found to contain strongly active gas; 175 cc. of gas were obtained from 7.5 liters of the water and, when put into a 380 cc. Wilson electroscope, increased the normal air leak by 12 times, giving this same result whether the water came through city supply pipes or directly from the lake; when water from which this gas was expelled, was aerated by dropping; it did not recover the power to give off radioactive gas after 16 days, indicating that the gas is not an emanation from any radioactive substance dissolved in the water; this is also shown by the fact that

CONNECTICUT (contd.)

New Haven County (contd.)
Radioactive Waters
Radioactivity Determinations
New Haven:
residue from the water is very slightly, if at all, active: 685; gas from the ground, about 5 ft. deep, was taken for comparison with that in the water in an effort to explain the presence of gas in the water; gas from the ground was 3 times more radioactive but both followed the same pattern in the gradual loss of their radioactivity: 685; further studies on radioactive gas from surface water and from a few feet below the ground, both types apparently being identical with the gaseous emanation from radium discovered by Dorn; new investigations made to determine if these "natural" radioactive gases contained a small proportion of some active constituent besides radium by comparing them directly with the radium emanation; full description of methods and apparatus used in investigation: 686; results of studies seem to indicate that the radioactive gases found in the surface water and in the ground near New Haven are identical with radium emanation and if any other radioactive constituent is present, it can only be in very small proportion; density of the radium emanation is about four times that of carbon dioxide: 686; the fact that radioactivity of gas in water at Cambridge, Massachusetts, and in soils at various places in Germany, is also mainly due to radium emanation, may indicate that radium may be widely distributed in the earth although not always in the surface layers: 686.

CONNECTICUT (contd.)

New Haven County (contd.)

Soil, Thorium-bearing

New Haven: radioactivity determinations on soil gave 8.9 x 10^{-14}g Ra/cc soil and 1.35 x 10^{-6}g Th/cc. soil: 868.

Sloane Physical Laboratory in New Haven: determination of the amount of thorium emanation in underground air around the laboratory indicated thorium emanation, eqivalent to that produced per cc. of earth, by 1.35 x 10^{-6}g Th under standard conditions: 933; average value found by Joly for thorium content of many common rocks equalled ten times the value for the earth at New Haven and for the radium content of these rocks, about one hundred times that for the earth at New Haven: 933; full description of the methods and apparatus used: 933.

Thorium Determinations

Radioactive Air

New Haven: radioactivity determinations made on air by suspension of six negatively charged wires in a wide zigzag between second story windows each sagging from the horizontal by different amounts to make the electrostatic field include as much surrounding air as possible; observations seemed to indicate that decaying activity on air wires was due to thorium and radium: 684; with a 3-hour exposure, 3-5% of total initial effect was due to thorium, the proportion depending on the ease with which emanations escape from the soil: 684; with a 12-hour exposure thorium activity is sometimes 15% of the whole and, with a long wire, its decay may be followed for several days; a small amount of additional more rapidly decaying activity may be present but experiments have not established this as yet: 684;

CONNECTICUT (contd.)

New Haven County (contd.)

Thorium Determinations

Radioactive Air

New Haven: radioactivity of rain and snow probably due solely to radium, the thorium effect being absent because rapid decay of the thorium emanation prevents its reaching, in appreciable quantities, the height at which raindrops are formed: 684.

Sloane Physical Laboratory in New Haven: determination of the amount of thorium emanation, in underground air around the laboratory indicated thorium emanation, equivalent to that produced per cc of earth, by 1.35 x 10^{-6}g Th under standard conditions: 933.

Radioactive Soil

New Haven: radioactivity determinations on soil gave 8.9 x 10^{-14}g Ra/cc soil and 1.35 x 10^{-6}g Th/cc soil: 868.

Sloane Physical Laboratory in New Haven: determination of the amount of thorium emanation in underground air around the laboratory indicated thorium emanation, equivalent to that produced per cc of earth, by 1.35 x 10^{-6}g Th under standard conditions: 933; average value found by Joly for thorium content of many common rocks equalled ten times the value for the earth at New Haven and for the radium content of these rocks, about one hundred times that for the earth at New Haven: 933; results of studies of radioactive properties of soil and underground air in various localities may provide valuable data for explaining differences in radioactivity of the atmosphere: 933; full description of the methods and apparatus used: 933.

CONNECTICUT (contd.)

New Haven County (contd.)
Thorium Occurrences
Branford: monazite: 968.
Hoadley Point quarries: monazite in small brown or greyish brown crystals plentiful here: 934.
West quarry on Hoadley Neck: allanite as an accessory mineral in bands and dikes of fine gneiss: 716.
Air, Thorium-bearing
Sloane Physical Laboratory in New Haven: determination of the amount of thorium emanation in underground air around the laboratory indicated thorium emanation equivalent to that produced, per cc of earth, by 1.35×10^{-6}g Th under standard conditions: 933; full description of the methods and apparatus used: 933.
Soil, Thorium-bearing
New Haven: radioactivity determinations on soil gave 8.9×10^{-14}g Ra/cc soil and 1.35×10^{-6}g Th/cc. soil: 868.
Sloane Physical Laboratory in New Haven: determination of the amount of thorium emanation in underground air around the laboratory indicated thorium emanation equivalent to that produced, per cc. of earth, by 1.35×10^{-6}g Th under standard conditions: 933; average value found by Joly for thorium content of many common rocks equalled ten times the value for the earth at New Haven and for the radium content of these rocks, about one hundred times that for the earth at New Haven: 933; full description of the methods and apparatus used: 933.
Torbernite Occurrences
Oxford: torbernite: 968.
Southford: torbernite: 968.
Southford, feldspar quarry southwest of, Oxford: torbernite as emerald green micaceous flakes coating quartz and other minerals, especially uraninite and allanite: 934.

CONNECTICUT (contd.)

New Haven County (contd.)
Torbernite Occurrences
Southford, Quarry 1½ mi. SW of: torbernite among minerals present: 736.
Uraninite Occurrences
Southford, feldspar quarry southwest of, Oxford: torbernite as emerald green micaceous flakes coating quartz and other minerals, especially uraninite and allanite: 934.
Uranium Occurrences
Central New England Province
Branford, Area about 12 sq. mi. on U.S. Highway 1 and Connecticut Highways 142 and 143: radioactivity of medium-grained biotite granite in Branford granite gneiss, 0.004-0.006% eU; radiometric and chemical analyses of Branford granite gneiss sample, 0.005% eU and 0.001% and 0.005% U, taken at a point 12.8 m. S of junction of U.S. Highway 1 and Connecticut Highway 79: 842.
Oxford: torbernite: 968.
Southford: torbernite: 968.
Southford, feldspar quarry southwest of, Oxford: torbernite as emerald green micaceous flakes coating quartz and other minerals, especially uraninite and allanite: 934.
Southford, Quarry 1½ mi. SW of: torbernite among minerals present: 736.

New London County
Aeschynite Occurrences
Waterford (township): aeschynite, monazite: 968.
Flatrock quarry: aeschynite in aeschynite in aegirite-granite; monazite, common, in good brown crystals: 934.

CONNECTICUT (contd.)

New London County (contd.)
Allanite Occurrences
Groton (township)
Eckerlein quarry east-southeast of Center Groton: allanite as an accessory mineral in Center Groton granite : 716, 718.
McGaughey quarry in Mystic: allanite as an accessory mineral in Mystic granite: 716; allanite as an accessory mineral in a quartz monzonite granite, related to the Westerly granite: 718.
Salter quarry on Thames River: allanite as an accessory mineral in Westerly granite: 716; allanite as an accessory mineral in Groton granite: 718.
Lyme (township)
Joshua Rock quarry at Joshua Rock on E shore of Connecticut River 2 mi. N of Essex wharf: allanite as an accessory mineral in Lyme granite gneiss: 716, 718.
New Anguilla quarry 1 mi. E of Anguilla Creek and 1½ mi. WNW of Westerly, Rhode Island, station: allanite as an accessory mineral in the Putnam gneiss capping the monzonite: 716.
Preston: allanite very rarely present in quartz-biotite schist, the most widely distributed rock of the area; allanite observed in only one thin section of this schist: 837.
Stonington (township)
Masons Island quarry on Pine Hill at NW end of Masons Island: allanite as an accessory mineral in Mamacoke gneiss: 716, 718.
Murray quarry in Pawcatuck: allanite as an accessory mineral in Sterling granite, with limonite coming from allanite: 716; allanite as an accessory mineral and limonite as a secondary mineral from allanite in Red Westerly granite (called Sterling granite on state geologic map): 718.

CONNECTICUT (contd.)

New London County (contd.)
Allanite Occurrences
Waterford (township)
Goos quarry, 2½ mi. NW of New London: allanite as an accessory mineral in Mamacoke gneiss: 718
Millstone Point (or Millstone) quarry on Millstone Point, 5 mi. S of New London: allanite, sixth mineral in abundance, as an accessory mineral in Millstone granite, with limonite from allanite: 716; allanite (sixth in abundance) as an accessory mineral in Millstone granite, related to Westerly granite, and limonite as a secondary mineral from allanite: 718; allanite in aplite: 754.
Waterford quarry, 3½ mi. SSW of New London, 2 3/4 mi. S of Waterford station, and 1 mi. E. of Pleasure Beach: allanite as an accessory mineral in the Connecticut white granite: 716, 718.
Edwardsite Occurrences
Norwich: edwardsite in gneiss; physical, chemical, and optical properties seem to be the same as those of monazite except that edwardsite contains Zr where monazite contains Th although newer chemical analyses seem to indicate some Th content in edwardsite: 956.
Yantic Falls at Norwich: edwardsite in bucholzite in gneiss; physical, chemical, and optical properties: 953.
Monazite Occurrences
Lyme (township): monazite: 968; monazite in railroad cuts: 934.
Norwich: monazite: 78, 82, 968; 1098; monazite and sillimanite associated: 960; monazite with bucholzite: 662; monazite with flesh-colored feldspar, bucholzite, zircon, corundum crystals, and black mica: 950.

CONNECTICUT (contd.)

New London County (contd.)

Monazite Occurrences

South Lyme: monazite: 968; monazite with biotite, titanite, etc, in quartz-orthoclase pegmatite vein: 853; rare occurrences of tourmaline, molybdenite, and monazite reported in pegmatites of this area: 837.

Stonington gneiss areas: monazite in alaskite: 754.

Waterford (township): aeschynite, monazite: 968.

Flatrock quarry 3 mi. NW of New London: monazite: 754; aeschynite in aegirite-granite; monazite, common, in good brown crystals: 934.

Yantic Falls, Area just below, at Norwich: monazite crystals in mica schist and pegmatite lenses: 934; large monazite crystals in fibrolite schist: 754.

Thorium Occurrences

Groton (township)

Eckerlein quarry ESE of Center Groton: allanite as an accessory mineral in Center Groton granite: 716, 718.

McGaughey quarry in Mystic: allanite as an accessory mineral in Mystic granite: 716; allanite as an accessory mineral in a quartz monzonite granite, related to the Westerly granite: 718.

Salter quarry on Thames River: allanite as an accessory mineral in Westerly granite: 716; allanite as an accessory mineral in Groton granite: 718.

Lyme (township): monazite: 968; monazite in railroad cuts: 934.

Joshua Rock quarry at Joshua Rock on E shore of Connecticut River 2 mi. N of Essex wharf in: allanite as an accessory mineral in Lyme granite gneiss: 716, 718.

New Anguilla quarry 1 mi. E of Anguilla Creek and 1½ mi. WNW of Westerly, Rhode Island, station: allanite as an accessory mineral in the Putnam gneiss capping the monzonite: 716.

CONNECTICUT (contd.)

New London County (contd.)

Thorium Occurrences

Norwich: monazite: 78, 82, 968, 1098; monazite with bucholzite: 662; monazite and sillimanite associated: 960; monazite with flesh-colored feldspar, bucholzite, zircon, corundum crystals, and black mica: 950; edwardsite in gneiss; physical, chemical, and optical properties seem to be the same as those of monazite except that edwardsite contains Zr where monazite contains Th although newer chemical analyses seem to indicate some Th content in edwardsite: 956.

Preston: allanite very rarely present in quartz-biotite schist, the most widely distributed rock of the area; allanite observed in only one thin section of this schist: 837.

South Lyme: monazite: 968; monazite with biotite, titanite, etc, in quartz orthoclase pegmatite vein: 853; rare occurrences of tourmaline, molybdenite, and monazite reported in pegmatites of this area: 837.

Stonington gneiss areas: monazite in alaskite: 754.

Stonington (township)

Masons Island quarry on Pine Hill at NW end of Masons Island: allanite as an accessory mineral in Mamacoke gneiss: 716, 718.

Murray quarry in Pawcatuck: allanite as an accessory mineral in Sterling granite, with limonite coming from allanite: 716; allanite as an accessory mineral and limonite as a secondary mineral from allanite in Red Westerly granite (called Sterling granite on state geologic map): 718.

Waterford (township): aeschynite, monazite: 968.

CONNECTICUT (contd.)

New London County (contd.)
Thorium Occurrences
Waterford (township)
Flatrock quarry 3 mi. NW of New London: monazite: 754; aeschynite in aegirite-granite; monazite, common, in good brown crystals: 934.
Goos quarry 2½ mi. NW of New London: allanite as an accessory mineral in Mamacoke gneiss: 718.
Millstone Point (or Millstone) quarry on Millstone Point 5 mi. SW of New London: allanite (sixth in abundance) as an accessory mineral in Millstone granite, related to Westerly granite, and limonite as a secondary mineral from allanite: 716, 718; allanite in aplite: 754.
Waterford quarry 3½ mi. SSW of New London, 2 3/4 mi. S of Waterford station, and 1 mi. E of Pleasure Beach: allanite as an accessory mineral in the Connecticut white granite: 716, 718.
Yantic Falls, Area just below, at Norwich: monazite crystals in mica schist and pegmatite lenses: 934; large monazite crystals in fibrolite schist: 754; edwardsite in bucholzite in gneiss; physical, chemical, and optical properties: 953.

Parathorite Occurrences:
See under individual county names and under Index III, Parathorite Occurrences-Connecticut: 968.

Pitchblende Occurrences:
See under individual county names and under Index III, Pitchblende Occurrences-Connecticut: 511, 949, 950, 955, 1035, 1098.

Prospectors' Guides:
See under individual county names and under Index III, Prospectors' Guides-Connecticut: 1101.

CONNECTICUT (contd.)

Radioactive Air:
See under individual county names and under Index III, Radioactive Air-Connecticut: 684, 933.

Radioactive Clay:
See under individual county names and under Index III, Radioactive Clay-Connecticut: 932, 993.

Radioactive Columbite:
See under individual county names and under Index III, Radioactive Columbite-Connecticut: 685, 686, 933.

Radioactive Rocks:
See under individual county names and under Index III, Radioactive Rocks-Connecticut: 793, 842.

Radioactive Soil:
See under individual county names and under Index III, Radioactive Soil-Connecticut: 686, 868, 933.

Radioactive Waters:
See under individual county names and under Index III, Radioactive Waters-Connecticut: 685, 686, 1035.

Radioactivity Determinations:
See under individual county names and under Index III, Radioactivity Determinations-Connecticut: 684, 685, 932, 933, 993.

Samarskite Occurrences:
See under individual county names and under Index III, Samarskite Occurrences-Connecticut: 654, 690, 706, 718, 720, 753, 754, 774, 883, 913, 914, 915, 916, 925, 934, 948, 968, 1012.

Soil, Thorium-bearing:
See under individual county names and under Index III, Soil, Thorium-bearing-Connecticut: 868, 933.

CONNECTICUT (contd.)

Thorite Occurrences:
See under individual county names and under Index III, Thorite Occurrences-Connecticut: 955, 968.

Thorium Determinations:
See under individual county names and under Index III, Thorium Determinations-Connecticut: 684, 933.

Thorium Occurrences:
See under individual county names and under Index III, Thorium Occurrences-Connecticut: 78, 82, 104, 652, 654, 662, 678, 679, 682, 689, 690, 702, 706, 707, 716, 718, 720, 725, 753, 754, 755, 774, 776, 788, 792, 793, 820, 827, 834, 836, 837, 839, 842, 853, 883, 913, 914, 915, 916, 925, 926, 933, 934, 939, 941, 948, 949, 950, 953, 955, 956, 960, 968, 977, 1012, 1028, 1031, 1035, 1036, 1053, 1058, 1080, 1098, 1100, 1105.
Bibliography: briefly annotated; includes a few older papers on thorium occurrences: 769.

Tolland County
Allanite Occurrences
Ellington quadrangle: allanite as a minor accessory in Glastonbury gneiss; associated with biotite near western border of gneiss zone: 706.
Lake Bonair, at roadside just N of W lobe: trace of allanite as a minor accessory in Glastonbury gneiss in analyzed sample: 706.
Radioactive Rocks
Stafford: radioactivity determinations on rusty biotite schist with bands of fine- to coarse-grained gray granite, probably Brimfield schist and Hubbardston granite, 0.003% eU; no determinations for U or ThO_2 content: 793.

Insert on p.216:
**Uranium Exploration
See under individual county names and under Index III, Uranium Exploration-Connecticut: 1101.

CONNECTICUT (contd.)

Tolland County (contd.)
Radioactive Rocks
Southbridge
Massachusetts and Connecticut Highway 15 at state boundary line, Area extending 1500 ft. NE along and 900 ft. normal to: radioactivity determinations on Carboniferous pegmatite in hornblende gneiss: channel sample of pegmatite from one of the most radioactive bands near Mashapaug Pond, 0.011% eU, 0.000% U, and 0.030% ThO_2; assuming there are about 11,000 t. of the more radioactive pegmatite material per foot of depth and that the channel sample is representative of entire area, then each foot of depth should contain about 6,500 lb. ThO_2: 793.
Thorium Occurrences
Ellington quadrangle: allanite as a minor accessory in Glastonbury gneiss; associated with biotite near western border of gneiss zone: 706.
Lake Bonair, at roadside just N of W lobe: trace of allanite as a minor accessory in Glastonbury gneiss in analyzed sample: 706.
Southbridge
Massachusetts and Connecticut Highway 15 at state boundary line, Area extending 1500 ft. NE along and 900 ft. normal to: radioactivity determinations on Carboniferous pegmatite in hornblende gneiss: channel sample of pegmatite from one of the most radioactive bands near Mashapaug Pond, 0.011% eU, 0.000% U, and 0.030% ThO_2; assuming there are about 11,000 t. of the more radioactive pegmatite material per foot of depth and that the channel

CONNECTICUT (contd.)

Tolland County (contd.)
Thorium Occurrences
Southbridge
sample is representative of entire area, then each foot of depth should contain about 6,500 lb. ThO_2: 793.

Torbernite Occurrences:
See under individual county names and under Index III, Torbernite Occurrences-Connecticut: 690, 718, 725, 736, 737, 753, 754, 788, 792, 836, 846, 912, 914, 915, 916, 934, 968, 974, 1028, 1031, 1098.

Uraconite Occurrences:
See under individual county names and under Index III, Uraconite Occurrences-Connecticut: 758, 934, 968.

Uraninite Occurrences:
See under individual county names and under Index III, Uraninite Occurrences-Connecticut: 7, 78, 82, 678, 682, 690, 702, 707, 718, 753, 754, 755, 764, 774, 776, 788, 792, 827, 836, 839, 846, 897, 915, 916, 925, 926, 934, 936, 939, 941, 948, 968, 974, 977, 1028, 1031, 1036, 1053, 1058, 1098, 1100.

Uranite Occurrences:
See under individual county names and under Index III, Uranite Occurrences-Connecticut: 662, 709, 721, 794, 949, 950, 968.
**(see p.215)

Uranium Occurrences:
See under individual county names and under Index III, Uranium Occurrences-Connecticut: 7, 13, 78, 82, 511, 649, 654, 662, 678, 679, 682, 690, 702, 707, 709, 718, 720, 721, 725, 728, 736, 737, 747, 753, 754, 755, 758, 764, 774, 776, 788, 792, 794, 827, 834, 836, 839, 842, 846, 881, 883, 897, 912, 913, 914, 915, 916, 925, 926, 934, 936, 939, 941, 948, 949, 950, 955, 958, 968, 974, 976, 977, 1012, 1028, 1031,

CONNECTICUT (contd.)

Uranium Occurrences:
See under etc. (contd.)
1035, 1036, 1053, 1058, 1078, 1080, 1098, 1100.
Bibliography: briefly annotated; includes a few older papers on uranium occurrences: 769.
Bibliography of U.S.G.S. Reports: 572, 1004.

Uranochre Occurrences:
See under individual county names and under Index III, Uranochre Occurrences-Connecticut: 754, 949, 950, 955.

Uranophane Occurrences:
See under individual county names and under Index III, Uranophane Occurrences-Connecticut: 690, 728, 836, 968.

Windham County
Allanite Occurrences
Sterling (township)
Bennett quarries 3/4 mi. E of Sterling station: allanite as an accessory mineral in Sterling granite gneiss: 716.
Bennett Bowlder quarry: allanite as an accessory mineral in the Sterling granite gneiss: 718.
Marriott quarry 1 mi. SW of Oneco station: allanite as an accessory mineral in the Sterling granite gneiss, like the Oneco quarry: 718.
Oneco quarry 1 mi. SW of Oneco: allanite as an accessory mineral in Sterling granite gneiss: 716, 718.
Windham (township)
Larrabee quarry 3/4 mi. NW of Willimantic station: allanite as an accessory mineral in a pink muscovite gneiss band in Willimantic gneiss: 716, 718.
Monazite Occurrences
Oneco: monazite: 968; monazite in good crystals: 934.
Willimantic: columbite, monazite, uraninite: 968; monazite, uraninite: 1098.

CONNECTICUT (contd.)

Windham County (contd.)
Monazite Occurrences
Windham: monazite: 968.
Radioactive Rocks
Central New England Province
Clark's Corners, 3 mi. W of, along U.S. Highway 6: radioactivity of schists and granitic rocks in Scotland muscovite schist and Eastford granite gneiss, 0.003-0.004% eU: 842.
Thorium Occurrences
Oneco: monazite: 968; monazite in good crystals: 934.
Sterling (township)
Bennett quarries 3/4 mi. E of Sterling station: allanite as an accessory mineral in the Sterling granite gneiss: 716.
Bennett Bowlder quarry: allanite as an accessory mineral in the Sterling granite gniess: 718.
Marriott quarry 1 mi. SW of Oneco station: allanite as an accessory mineral in the Sterling granite gneiss, like the Oneco quarry: 718.
Oneco quarry 1 mi. SW of Oneco: allanite as an accessory mineral in the Sterling granite gneiss: 716, 718.
Willimantic: columbite, monazite, uraninite: 968; monazite, uraninite: 1098.
Windham: monazite: 968.
Windham (township)
Larrabee quarry 3/4 mi. NW of Willimantic station: allanite as an accessory mineral in a pink muscovite gneiss band in Willimantic gneiss: 716, 718.
Uraninite Occurrences
Willimantic: uraninite: 78, 82; columbite, monazite, uraninite: 968; monazite, uraninite: 1098.
Uranium Occurrences
Willimantic: uraninite: 78, 82; columbite, monazite, uraninite: 968; monazite, uraninite: 1098.

CONNECTICUT (contd.)

Xenotime Occurrences
See under individual county names and under Index III, Xenotime Occurrences-Connecticut: 820, 934, 968, 1028, 1031.

Yttrotantalite Occurrences
See under individual county names and under Index III, Yttrotantalite Occurrences-Connecticut: 968.

DELAWARE

General
Monazite Occurrences
Coastal Plain: monazite in buried beach and bar deposits formed in Cretaceous and Tertiary time: 883.

Thorium Occurrences
Coastal Plain: monazite in buried beach and bar deposits formed in Cretaceous and Tertiary time: 883.

Monazite Occurrences
See under individual county names and under Index III, Thorium Occurrences-Delaware: 883.

Thorium Occurrences
See under individual county names and under Index III, Thorium Occurrences-Delaware: 883.

ILLINOIS

General

Black Shales, Uranium-bearing

General: a total of 175 samples of dark gray to black shales of Pennsylvanian, Mississippian, Devonian-Mississippian, and Ordovician age from 44 counties were examined; the highest percent equivalent uranium was 0.017 and the uranium oxide content of the 15 samples having the highest eU ranged from 0.001 to 0.014% or an average of 0.002% lower than their percent eU; the ranges in percent eU for the shales of the four geologic ages represented were Pennsylvanian, 0.000 to 0.017, Mississippian, 0.000 to 0.009, Devonian-Mississippian, 0.001 to 0.014, and Ordovician, 0.001 to 0.002; black shales had a higher percent eU than the gray to dark-gray shales averaging 0.005% eU for 92 samples of the black shales with 0.017 as the maximum, and averaging 0.004% eU for 73 samples of gray and gray black shales with 0.013% eU as the maximum; the phosphatic bands and nodules in the black shales, however, were more radioactive than the associated shale; the geologic units represented by two or more samples and having the highest percent equivalent uranium were the Stonefort and Davis shales with averages of 0.008% eU and the New Albany, Liverpool, Macoupin, Shoal Creek, and Cohn shales with averages of 0.007% eU; since all the shales contain much less eU and uranium oxide than the 0.1% uranium oxide content of the lowest grade of ore on which the U.S.A.E.C. has quoted prices, none of the shales tested appears to be of commercial importance at the present time: 1104.

ILLINOIS

General (contd.)

Black Shales, Uranium-bearing

General: uranium in Chattanooga shale or its equivalent: 883; uranium in Mountain Glen black shale of Devonian age: 841; uranium in black shales: 426; uranium-bearing black shale considered as low-grade non-commercial deposits at the present time: 1106.

Coal, Uranium-bearing

General: field reconnaissance and radioactivity studies on channel samples of commercially important coal beds in the Caseyville, Tradewater, Carbondale, and McLeansboro formations of Pennsylvanian age, and samples of black, hard, sheety roof shales of several coal beds in southern and central part of state showed that the coal beds usually contain less than 0.001% U, except for the Herrin No. 6 coal which had 0.008% U and its ash, 0.125% U, and that the shales overlying the coals ranged in radioactivity from 0.003-0.018% eU; geology; stratigraphy: 894.

Radioactive Black Shale

General: a total of 175 samples of dark gray to black shales of Pennsylvanian, Mississippian, Devonian-Mississippian, and Ordovician age from 44 counties were examined; the highest percent equivalent uranium was 0.017 and the uranium oxide content of the 15 samples having the highest eU ranged from 0.001 to 0.014% or an average of 0.002% lower than their percent eU; the ranges in percent eU for the shale of the four geologic ages represented were Pennsylvanian 0.000 to 0.017, Mississippian, 0.000 to 0.009, Devonian-Mississippian, 0.001 to 0.014, and Ordovician,

ILLINOIS (contd.)

General (contd.)

Radioactive Black Shale

General: 0.001 to 0.002; black shales had higher percent eU than the gray to dark-gray shales averaging 0.005% eU for 92 samples of the black shales with 0.017 as the maximum, and averaging 0.004% eU for 73 samples of gray and gray black shales with 0.013% eU as the maximum; the phosphatic bands and nodules in the black shales, however, were more radioactive than the associated shale; the geologic units represented by two or more samples and having the highest percent equivalent uranium were the Stonefort and Davis shales with averages of 0.008% eU and the New Albany, Liverpool, Macoupin, Shoal Creek, and Cohn shales with averages of 0.007% eU; since all the shales contain much less eU and uranium oxide than the 0.1% uranium oxide content of the lowest grade of ore on which the U.S.A.E.C. has quoted prices, none of the shales tested appears to be of commercial importance at the present time: 1104;

Illinois Basin, western part: black shales in the Pennsylvanian cyclotherms, remarkably uniform in thickness and lithologic properties over large areas; shales show low radioactivity as measured by alpha particle emission, and studies were made to see if they were regionally uniform in this attribute also; 175 samples of the black shale overlying Coal No. 6 were used and taken from locations along the 200-mile extent of the outcrop belt; present results show that while the black shale varied noticeably

ILLINOIS (contd.)

General (contd.)

Radioactive Black Shale

Illinois Basin, western part: in radioactivity from sample to sample within a single strip mine, there was no definite evidence of a strong regional trend along the outcrop belt; method of sampling: 819.

Western Part: black shale over No. 2 Coal (Pennsylvanian), a black fissile shale with oval concretions and thin veins of black shiny material, radioactivity $80.4 \pm 2.0 \times 10^{-12}$g. Ra/g. rock: 929; relationship of radioactivity of sample to organic content and sedimentation studied: 928.

Radioactive Fluorite

Kentucky-Illinois fluorspar mining district: fluorite vein, mostly CaF with some ZnS and PbS but no $CaCO_3$, radioactivity less than 2×10^{-12}g. Ra/g. rock: 929; fluorite vein, with 70% sphalerite and 30% fluorite, radioactivity less than 2×10^{-12}g. Ra/g. rock: 929; two fluorite veins, relationship of radioactivity samples to organic content and sedimentation studied: 928.

Radioactive Shale

General: a total of 175 samples of dark gray to black shales of Pennsylvanian, Mississippian, Devonian-Mississippian, and Ordovician age from 44 counties were examined; the highest percent equivalent uranium was 0.017 and the uranium oxide content of the 15 samples having the highest eU ranged from 0.001 to 0.014% or an average of 0.002% lower than their percent eU; the ranges in percent eU for the shales of the four geologic ages represented were Pennsylvanian,

ILLINOIS (contd.)

General
Radioactive Shale
General:
0.000 to 0.017, Mississippian, 0.000 to 0.009, Devonian-Mississippian, 0.001 to 0.014, and Ordovician, 0.001 to 0.002; black shales had a higher percent eU than the gray to dark-gray shales averaging 0.005% eU for 92 samples of the black shales with 0.017 as the maximum, and averaging 0.004% eU for 73 samples of gray and gray black shales with 0.013% eU as the maximum; the phosphatic bands and nodules in the black shales, however, were more radioactive than the associated shale; the geologic units represented by two or more samples and having the highest percent equivalent uranium were the Stonefort and Davis shales with averages of 0.008% eU and the New Albany, Liverpool, Macoupin, Shoal Creek, and Cohn shales with averages of 0.007% eU; since all the shales contain much less eU and uranium oxide than the 0.1% uranium oxide content of the lowest grade of ore on which the U.S.A.E.C. has quoted prices, none of the shales tested appears to be of commercial importance at the present time: 1104; field reconnaissance and radioactivity studies on channel samples of commercially important coal beds in the Caseyville, Tradewater, Carbondale, and McLeansboro formations of Pennsylvanian age, and samples of black, hard, sheety roof shales of several coal beds in southern and central part of state showed that the coal beds usually contain less than 0.001% U, except for the Herrin No. 6 coal which had 0.008% U and its ash, 0.125% U, and that the shales overlying the

ILLINOIS (contd.)

General
Radioactive Shale
General:
coals ranged in radioactivity from 0.003-0.018% eU; geology; stratigraphy: 894.
Southeast Part: examination of 157 samples of coal and carbonaceous shale from rocks of Pennsylvanian age, collected from 27 localities, showed no radioactivity; grayish-black shale forming the roof of No. 5 coal, a correlative of the No. V coal in Indiana, and above the No. 6 coal are radioactive but the amount of radioactivity has not been determined; shale above the No. 5 coal is grayish-black, hard, sheety, and widespread in the Eastern Interior Coal Basin, and contains marine fossils; grayish-black shale above No. 6 coal grades laterally into light gray shale which is probably non-radioactive: 996.
Uranium Occurrences
General:
a total of 175 samples of dark gray to black shales of Pennsylvanian, Mississippian, Devonian-Mississippian, and Ordovician age from 44 counties were examined; the highest percent equivalent uranium was 0.017 and the uranium oxide content of the 15 samples having the highest eU ranged from 0.001 to 0.014% or an average of 0.002% lower than their percent eU; the ranges in percent eU for the shales of the four geologic ages represented were Pennsylvanian, 0.000 to 0.017, Mississippian, 0.000 to 0.009, Devonian-Mississippian, 0.001 to 0.014, and Ordovician, 0.001 to 0.002; black shales had a higher percent eU than the gray to dark-gray shales averaging 0.005% eU for 92 samples of the

ILLINOIS (contd.)

General (contd.)
Uranium Occurrences
General:
black shales with 0.017 as the maximum, and averaging 0.004% eU for 73 samples of gray and gray black shales with 0.013% eU as the maximum; the phosphatic bands and nodules in the black shales, however, were more radioactive than the associated shale; the geologic units represented by two or more samples and having the highest percent equivalent uranium were the Stonefort and Davis shales with averages of 0.008% eU and the New Albany, Liverpool, Macoupin, Shoal Creek, and Cohn shales with averages of 0.007% eU; since all the shales contain much less eU and uranium oxide than the 0.1% uranium oxide content of the lowest grade of ore on which the U.S.A.E.C. has quoted prices, none of the shales tested appears to be of commercial importance at the present time: 1104; field reconnaissance and radioactivity studies on channel samples of commercially important coal beds in the Caseyville, Tradewater, Carbondale, and McLeansboro formations of Pennsylvanian age, and samples of black, hard, sheety roof shales of several coal beds in southern and central part of state showed that the coal beds usually contain less than 0.001% U, except for the Herrin No. 6 coal which had 0.008% U and its ash, 0.125% U, and that the shales overlying the coals ranged in radioactivity from 0.003-0.018% eU; geology; stratigraphy: 894; uranium in Chattanooga shale or its equivalent: 883; uranium in Mountain Glen black shale of Devonian age: 841; uranium in black shales: 426;

ILLINOIS (contd.)

General (contd.)
Uranium Occurrences
General:
uranium-bearing black shale considered as low-grade non-commercial deposits at the present time: 1106; thin source strata in oil fields and oil shales may be potential sources of uranium: 642.
Black Shales, Uranium-bearing
General: a total of 175 samples of dark gray to black shales of Pennsylvanian, Mississippian, Devonian-Mississippian, and Ordovician age from 44 counties were examined; the highest percent equivalent uranium was 0.017 and the uranium oxide content of the 15 samples having the highest eU ranged from 0.001 to 0.014% or an average of 0.002% lower than their percent eU; the ranges in percent eU for the shales of the four geologic ages represented were Pennsylvanian, 0.000 to 0.017, Mississippian, 0.000 to 0.009, Devonian-Mississippian, 0.001 to 0.014, and Ordovician, 0.001 to 0.002; black shales had a higher percent eU than the gray to dark-gray shales averaging 0.005% eU for 92 samples of the black shales with 0.017 as the maximum, and averaging 0.004% eU for 73 samples of gray and gray black shales with 0.013% eU as the maximum; the phosphatic bands and nodules in the black shales, however, were more radioactive than the associated shale; the geologic units represented by two or more samples and having the highest percent equivalent uranium were the Stonefort and Davis shales

ILLINOIS (contd.)

General (contd.)
Uranium Occurrences
Black Shales, Uranium-bearing
General:
with averages of 0.008% eU and the New Albany, Liverpool, Macoupin, Shoal Creek, and Cohn shales with averages of 0.007% eU; since all the shales contain much less eU and uranium oxide than the 0.1% uranium oxide content of the lowest grade of ore on which the U.S.A.E.C. has quoted prices, noneof the shales tested appears to be of commercial importance at the present time: 1104; uranium in Chattanooga shale or its equivalent: 883; uranium in Mountain Glen black shale of Devonian age: 841; uranium in black shales: 426; uranium-bearing black shale considered as low-grade non-commercial deposits at the present time: 1106.

Coal, Uranium-bearing
General: field reconnaissance and radioactivity studies on channel samples of commercially important coal beds in the Caseyville, Tradewater, Carbondale, and McLeansboro formations of Pennsylvanian age, and samples of black, hard, sheety roof shales of several coal beds in southern and central part of state showed that the coal beds usually contain less than 0.001% U, except for the Herrin No. 6 coal which had 0.008% U and its ash, 0.125% U, and that the shales overlying the coals, ranged in radioactivity from 0.003-0.018% eU; geology; stratigraphy: 894.

Black Shales, Uranium-bearing
See under individual county names and under Index III, Black Shales, Uranium-bearing-Illinois: 426, 841, 883, 1096, 1104, 1106.

ILLINOIS (contd.)

Bond County
Radioactive Black Shale
Stream cut in SW¼, NE¼, SE¼ Sec. 19, T. 6 N., R. 4 W.: sample of unnamed shale 50 ft. above Shoal Creek limestone showed no eU: 1104.

Bureau County
Radioactive Black Shale
Stream cut in NE¼, SW¼, NW¼ Sec. 33, T. 16 N., R. 11 E.: sample of LaSalle and Livingston shales below limestone gave no eU: 1104.
Strip-mine dump in SW¼, NE¼, NE¼ Sec. 29, T. 16 N., R. 6 E.: sample of Brereton shale above No. 6 coal gave 0.006% eU: 1104.
Radioactive Shale
Spring Valley: gray shale over No. 2 Coal (Pennsylvanian), radioactivity 14.4 +-2.1 x 10^{-12}g.Ra/g. rock: 929; relationship of radioactivity of sample to organic content and sedimentation studied: 928.

Calhoun County
Radioactive Shale
Quarry in center of SW¼,NE¼ Sec. 23, T. 12 S., R. 2 W.: shale at top of Hannibal formation gave 0.005% eU: 1104.
Valley wall in SE¼,NE¼,SW¼ Sec. 17, T. 11 S., R. 2 W.: two shale samples from the Maquekota formation tested: the first below the 6 in. red zone in basal part of formation gave 0.002% eU and the second above the same zone gave 0.001% eU: 1104.
Weathered bluff in NW¼,NE¼ Sec. 35, T. 9 S., R. 3 W.: shale near top of Hannibal formation showed 0.007% eU: 1104.

ILLINOIS (contd.)

Cass County
Radioactive Black Shale
Bluff in SW¼,SW¼,NE¼ Sec. 11, T. 18 N., R. 11 W.: sample of Liverpool shale above No. 2 coal gave 0.001% eU: 1104.

Clark County
Black Shales, Uranium-bearing
Road cut in NE¼,NW¼,NW¼ Sec. 20, T. 11 N., R. 10 W.: sample of Macoupin shale above Macoupin coal gave 0.009% eU by radiometric assay and 0.014% U_3O_8 by chemical analysis: 1104.
Radioactive Black Shale
Road cut in NE¼,NW¼,NW¼ Sec. 20, T. 11 N., R. 10 W.: sample of Macoupin shale above Macoupin coal gave 0.009% eU by radiometric assay and 0.014% U_3O_8 by chemical analysis: 1104.
Road cut in SE¼,NE¼,SE¼ Sec. 30, T. 12 N., R. 12 W.: sample of unnamed shale above coal that crops out near town of Divide gave 0.004% eU: 1104.
Stream cut in SE¼,NE¼,SE¼ Sec. 3, T. 9 N., R. 12 W.: sample of Macoupin shale above Macoupin coal gave 0.004% eU: 1104.
Stream cut in SE¼,NW¼,SE¼ Sec. 3, T. 9 N., R. 12 W.: sample of Shoal Creek shale below Shoal Creek limestone gave 0.004% eU: 1104.
Stream cut in SE¼,SW¼,NW¼ Sec. 4, T. 9 N., R. 12 W.: sample of unnamed shale above coal that crops out near town of Divide, gave 0.004% eU: 1104.
Radioactive Shale
Stream cut in SW¼,NW¼,SE¼ Sec. 3, T. 9 N., R. 12 W.: sample of unnamed shale about 30 ft. below Livingstone limestone gave 0.001% eU: 1104.

ILLINOIS (contd.)

Clark County (contd.)
Uranium Occurrences
Road cut in NE¼,NW¼,NW¼ Sec. 20, T. 11 N., R. 10 W.: sample of Macoupin shale above Macoupin coal gave 0.009% eU by radiometric assay and 0.014% U_3O_8 by chemical analysis: 1104.
Black Shales, Uranium-bearing
Road cut in NE¼,NW¼,NW¼ Sec. 20, T. 11 N., R. 10 W.: sample of Macoupin shale above Macoupin coal gave 0.009% eU by radiometric assay and 0.014% U_3O_8 by chemical analysis: 1104.

Clay County
Radioactive Black Shale
Iola Stone Co. strip mine, 3.7 mi. SSE of Iola: radioactivity of clay, shale, and coal in Omega coal, starting with upper layer: black clay, less than 0.001% eU; interbedded sandstone and black shale in very thin beds, less than 0.001% eU; four non-radioactive layers of limestone and shale; bright coal separated by non-radioactive clay parting from medium bright to dull coal, coals, both less than 0.001% eU: 894.
Stream cut in SW¼,SE¼,SW¼ Sec. 32, T. 3 N., R. 8 E.: sample of Bogota shale above Upper Bogota coal gave 0.004% eU: 1104.
Valley wall in SW¼,SW¼,SW¼ Sec. 10, T. 4 N., R. 5 E.: sample of unnamed shale about 25 ft. above Omega limestone gave 0.006% eU: 1104.
Radioactive Clay
Iola Stone Co. strip mine, 3.7 mi. SSE of Iola: radioactivity of clay, shale, and coal in Omega coal, starting with upper layer: black clay, less than

ILLINOIS (contd)

Clay County (contd.)

Radioactive Clay

Iola Stone Co. strip mine, 3.7 mi. SSE of Iola: 0.001% eU; interbedded sandstone and black shale in very thin beds, less than 0.001% eU; four non-radioactive layers of limestone and shale; bright coal separated by non-radioactive clay parting from medium bright to dull coal, both less than 0.001% eU: 894.

Radioactive Coal

Iola Stone Co. strip mine, 3.7 mi. SSE of Iola: radioactivity of clay, shale, and coal in Omega coal, starting with upper layer: black clay, less than 0.001% eU; interbedded sandstone and black shale in very thin beds, less than 0.001% eU; four non-radioactive layers of limestone and shale; bright coal separated by non-radioactive clay parting from medium bright to dull coal, both less than 0.001% eU: 894.

Radioactive Rocks

Iola Stone Co. strip mine, 3.7 mi. SSE of Iola: radioactivity of clay, shale, and coal in Omega coal, starting with upper layer: black clay, less than 0.001% eU; interbedded sandstone and black shale in very thin beds, less than 0.001% eU; four non-radioactive layers of limestone and shale; bright coal separated by non-radioactive clay parting from medium bright to dull coal, both less than 0.001% eU: 894.

Well in Sec. 26-T.4 N., R. 7 E.: Aux Vase sandstone from 2878-2883 ft. depth, radioactivity less than 2×10^{-12}g. Ra/g. rock; McClosky oolitic limestone sample from 3017-27 ft. depth, radioactivity $6.0 \pm 1.8 \times 10^{-12}$g. Ra/g. rock: 929.

ILLINOIS (contd.)

Clay County (contd.)

Radioactive Rocks

Well in Sec. 26 T. 4 N., R. 7 E.: relationship of radioactivity of sample to organic content and sedimentation studied: 928.

Clays, Uranium-bearing

See under individual county names and under Index III, Clays, Uranium-bearing-Illinois: 1096.

Clinton County

Black Shales, Uranium-bearing

Stream cut in SW¼,SE¼,SE¼ Sec. 22, T. 2 N., R. 5 W.: sample of Shoal Creek shale below Shoal Creek limestone gave 0.012% eU by radiometric assay and 0.013% U_3O_8 by chemical analysis: 1104.

Radioactive Black Shale

Stream cut in NE¼,SW¼,NE¼ Sec. 13, T. 3 N., R. 1 W.: sample of Macoupin shale above Macoupin coal gave no eU: 1104.

Stream cut in SW¼,SE¼,SE¼ Sec. 22, T. 2 N., R. 5 W.: sample of Shoal Creek shale below Shoal Creek limestone gave 0.012% eU by radiometric assay and 0.013% U_3O_8 by chemical analysis: 1104.

Radioactive Rocks

Well in Sec. 12, T. 1 N., R. 1 W.: relationship of radioactivity of sample to organic content and sedimentation studied: 928; Devonian limestone sample from 2006 ft. depth, radioactivity $5.4 \pm 1.8 \times 10^{-12}$g. Ra/g. rock: 929.

Uranium Occurrences

Stream cut in SW¼,SE¼,SE¼ Sec. 22, T. 2 N., R. 5 W.: sample of Shoal Creek shale below Shoal Creek limestone gave 0.012% eU by radiometric assay and 0.013% U_3O_8 by chemical analysis: 1104.

ILLINOIS (contd.)

Clinton County (contd.)
Uranium Occurrences
Black Shales, Uranium-bearing
Stream cut in SW¼,SE¼,SE¼ Sec. 22, T. 2 N., R. 5 W.: sample of Shoal Creek shale below Shoal Creek limestone gave 0.012% eU by radiometric assay and 0.013% U_3O_8 by chemical analysis: 1104.

Coal, Uranium-bearing:
See under individual county names and under index III, Coal, Uranium-bearing-Illinois: 894.

Coles County
Radioactive Black Shale
Stream cut in SW¼,SW¼,SE¼ Sec. 3, T. 12 N., R. 10 E.: sample of unnamed shale above coal that crops out near town of Divide gave 0.002% eU: 1104.

Crawford County
Radioactive Black Shale
Stream cut in SE¼,SW¼,SW¼ Sec. 14, T. 5 N., R. 11 W.: sample of Bogota shale above Bogota coal gave 0.002% eU: 1104.

Edgar County
Radioactive Black Shale
Stream cut in SE¼,SE¼,SE¼ Sec. 10, T. 14 N., R. 11 W.: sample of LaSalle and Livingston shales below limestone gave 0.006% eU: 1104.
Stream cut in SW¼,NE¼,SW¼ Sec. 29, T. 14 N., R. 10 W.: sample of Macoupin shale above Macoupin coal gave 0.009% eU: 1104.
Radioactive Shale
Road cut in NW¼,SE¼,NW¼ Sec. 32, T. 15 N., R. 10 W.: sample of Brouillett shale above Brouillett coal gave 0.002% eU: 1104.
Stream cut in center of SW¼,Sec. 2, T. 14 N., R. 11 W.: sample of unnamed shale 30 ft. below Livingston limestone gave no eU: 1104.

ILLINOIS (contd.)

Effingham County
Radioactive Black Shale
Stream cut in SE¼,NE¼,NW¼ Sec. 28, T. 6 N., R. 6 E.: sample of Shumway shale above Shumway coal gave 0.003% eU: 1104.
Stream cut in SE¼,SE¼,SW¼ Sec. 26, T. 9 N., R. 5 E.: sample of Shumway shale above Shumway coal gave 0.001% eU: 1104.

Franklin County
Radioactive Coal
West Frankfort
New Orient mine: No. 6 Coal (Pennsylvanian), radioactivity less than 2×10^{-12}g. Ra/g. rock: 929; relationship of radioactivity of sample to organic content and sedimentation studied: 928.
New Orient mine, No. 2: No. 6 Coal (Pennsylvanian), radioactivity less than 2×10^{-12}g. Ra/g. rock: 929; relationship of radioactivity of sample to organic content and sedimentation studied: 928.

Fulton County
Radioactive Black Shale
Stream cut in NE¼,NW¼,NW¼ Sec. 17, T. 5 N., R. 4 E.: sample of Liverpool shale above No. 2 coal gave 0.006% eU: 1104.
Stream cut in SW¼,SE¼,NW¼ Sec. 14, T. 7 N., R. 1 E.: sample of Seahorne shale below Seahorne limestone gave 0.002% eU: 1104.
Strip mine in N¼,NE¼, Sec. 3, T.3 N., R. 2 E.: sample of St. David shale above No. 5 coal gave 0.007% eU: 1104.
Strip mine in NW¼,SW¼,SW¼ Sec. 28, T. 6 N., R. 3 E.: sample of St. David shale above No. 5, coal gave 0.002% eU: 1104.

ILLINOIS (contd.)

Gallatin County

Black Shale, Uranium-bearing

Stream cut in SE¼,NE¼,NW¼ Sec. 16, T. 9 S., R. 10 E.: sample of Liverpool shale above No. 2 coal gave 0.017% eU, the highest reported in the state, by radiometric assay and 0.014% U_3O_8 by chemical analysis: 1104.

Radioactive Black Shale

Equality quadrangle

Shawneetown Coal Co. drift mine in Shawneetown: radioactivity of shale and coal in Harrisburg No. 5 coal, starting with upper layer: carbonaceous siltstone, 0.003% eU; hard black shale, 0.008% eU; non-radioactive gray clay capped by thin replacement layer of siltstone, which showed the highest radioactivity here, 0.10-0.15 mr/hr, but of which not enough was obtained to test with scaler; bright coal with large amount of pyrite and badly crushed in placers, 0.001% eU; and underlying layer of same type coal, less than 0.001% eU: 894.

Stream cut in SE¼,NE¼,NW¼ Sec. 16, T. 9 S., R. 10 E.: sample of Liverpool shale above No. 2 coal gave 0.017% eU, the highest reported in the state, by radiometric assay and 0.014% U_3O_8 by chemical analysis: 1104.

Strip mine in center of NW¼ Sec. 16, T. 10 S., R. 8 E.: sample of St. David shale above No. 5 coal gave 0.004% eU: 1104.

Radioactive Coal

Equality quadrangle

B. & W. Coal Co. shaft mine at Junction: radioactivity of Harrisburg No. 5 coal, starting with upper layer: pyritic bone coal, 0.002% eU; medium attrital coal, brighter in upper part of seam, with pyrite and calcite on joint faces and no partings, 0.002% eU; and medium attrital coal, less than 0.001% eU: 894.

ILLINOIS (contd.)

Gallatin County

Radioactive Coal

Shawneetown quadrangle

Shawneetown Coal Co. drift mine in Shawneetown: radioactivity of shale and coal in Harrisburg No. 5 coal, starting with upper layer: carbonaceous siltstone, 0.003% eU; hard black shale, 0.008% eU; non-radioactive gray clay capped by thin replacement layer of siltstone, which showed the highest radioactivity here, 0.10-0.15 mr/hr, but of which not enough was obtained to test with scaler; bright coal with large amount of pyrite and badly crushed in places, 0.001% eU; and underlying layer of same type coal, less than 0.001% eU: 894.

Radioactive Shale

Shawneetown quadrangle

Shawneetown Coal Co. drift mine in Shawneetown: radioactivity of shale and coal in Harrisburg No. 5 coal, starting with upper layer: carbonaceous siltstone, 0.003% eU; hard black shale, 0.008% eU; non-radioactive gray clay capped by thin replacement layer of siltstone, which showed the highest radioactivity here, 0.10-0.15 mr/hr, but of which not enough was obtained to test with scaler; bright coal with large amount of pyrite and badly crushed in places, 0.001% eU; and underlying layer of same type coal, less than 0.001% eU: 894.

Uranium Occurrences

Stream cut in SE¼,NE¼,NW¼ Sec. 16, T. 9 S., R. 10 E.: sample of Liverpool shale above No. 2 coal gave 0.017% eU, the highest reported in the state, by

ILLINOIS (contd.)

Gallatin County (contd.)
Uranium Occurrences
Stream cut in SE¼,NE¼,NW¼ Sec. 16, T. 9 S., R. 10 E.: radiometric assay and 0.014% U_3O_8 by chemical analysis: 1104.
Black Shale, Uranium-bearing
Stream cut in SE¼,NE¼,NW¼,Sec. 16, T. 9 S., R. 10 E.: sample of Liverpool shale above No. 2 coal gave 0.017% eU, the highest reported in the state, by radiometric assay and 0.014% U_3O_8 by chemical analysis: 1104.

Green County
Radioactive Black Shale
Strip mine in SW¼,SW¼,SW¼ Sec. 24, T. 12 N., R. 11 W.: sample of Liverpool shale above No. 2 coal gave 0.009% eU: 1104.
Radioactive Shale
Strip mine in NW¼,SE¼,NW¼ Sec. 21, T. 12 N., R. 11 W.: sample of Summum shale above No. 4 coal gave 0.003% eU: 1104.

Grundy County
Radioactive Black Shale
Stream cut in NW¼,SE¼,NE¼ Sec. 1, T. 32 N., R. 7 E.: sample of St. David shale above No. 5 coal gave 0.002% eU: 1104.
Stream cut in SE¼,NW¼,NW¼ Sec. 20, T. 33 N., R. 7 E.: sample of St. David shale above No. 5 coal gave 0.004% eU: 1104.

Hardin County
Black Shales, Uranium-bearing
Hicks Dome
Outcrop in a creek in Sec. 25, T. 11 S., R. 7 E.: three of five samples of New Albany shale gave respectively 0.024, 0.022, and 0.022% eU and 0.007, 0.005, and 0.007% U_3O_8 while two others gave only 0.005 and 0.010% eU: 1096.

ILLINOIS (contd.)

Hardin County (contd.)
Black Shale, Uranium-bearing
Stream cut in SW¼,NW¼,SE¼ Sec. 25, T. 11 S., R. 7 E.: four samples of New Albany shale gave respectively 0.003, 0.003, 0.014, and 0.009% eU by radiometric assay while a chemical analysis of the New Albany shale, probably of the sample or samples with highest percent eU, gave 0.006% U_3O_8: 1104.
Clays, Uranium-bearing
Hicks Dome
General: 37 samples of red clay from test pits, road cuts, trenches, the waste pile of Rose mine, and other similar sources gave from 0.000-0.144 % eU with an average of 0.011 % eU and 8 of the samples gave from 0.002-0.014% U_3O_8 with an average of 0.006% U_3O_8; 5 samples of yellow clay from similar sources including residual clay overlying Osage chert, gave from 0.048-0.155% eU with an average of 0.108% eU and 0.005-0.014% U_3O_8 with an average of 0.010% U_3O_8; 2 samples of red and yellow clay averaged 0.079% eU and 0.020% U_3O_8; one gray clay sample gave 0.027% eU and 0.002% U_3O_8: 1096.
Road cut in Sec. 24, T. 11 S., R. 7 E.: red clay gave 0.019% eU and 0.007% U_3O_8: 1096.
Roadside ditch in Sec. 25, T. 11 S., R. 7 E.: red clay gave 0.021% eU and 0.009% U_3O_8: 1096.
Samples from Sec. 30, T. 11 S., R. 8 E.: two samples of red clay from a gully gave respectively 0.144 and 0.080% eU, and 0.014 and 0.004% U_3O_8; three samples of yellow clay from the same gully gave

ILLINOIS (contd.)

Hardin County (contd.)

Clays, Uranium-bearing

Samples from Sec. 30, T. 11 S., R. 8 E.: respectively 0.132, 0.080, and 0.125% eU and 0.010, 0.007, and 0.005% U_3O_8; red clay in test pit, 5 ft. deep, gave 0.013% eU and 0.003% U_3O_8; a red clay from a bulldozer trench gave 0.015% eU and 0.006% U_3O_8 while two samples of red and yellow clay from the same trench gave 0.081 and 0.077% eU and 0.018 and 0.023% U_3O_8; two samples of red clay from a test pit gave 0.016 and 0.027% eU and 0.002 and 0.006% U_3O_8; a gray clay from a bulldozer trench gave 0.027% eU and 0.002% U_3O_8; a brown clay from 2 ft. below the surface (1 in. auger hole) gave 0.016% eU and 0.004% U_3O_8; a yellow clay in a bulldozer trench gave 0.155% eU and 0.014% U_3O_8 while the -2 micron fraction of the same clay gave 0.251% eU and 0.019% U_3O_8; a red clay from 1 ft. below the surface gave 0.029% eU and 0.006% U_3O_8; and a yellow clay from a bulldozer trench gave 0.048% eU and 0.013% U_3O_8: 1096.

Igneous Rocks, Uranium-bearing

Hicks, Area in NW$\frac{1}{4}$,SE$\frac{1}{4}$,SE$\frac{1}{4}$ Sec. 23, T. 11 S., R. 7 E. near: sample from a peridotite dike gave 0.021% eU and 0.013% U_3O_8: 1096.

Hicks Dome

Henry Hamp, Jr. No. 1 well: radioactive explosion breccia ranging from 0.01-0.03% eU; low uranium content found by chemical analysis may mean uranium does not cause the radioactivity here: 1096.

Radioactive Black Shale

Hicks Dome

General: six samples of New Albany shale gave from 0.005-0.024% eU with an average of 0.015% eU and three of the samples gave from 0.005-0.007% U_3O_8 with an average of 0.006% U_3O_8; a sample of Osage shale overlying the New Albany gave 0.002% eU: 1096.

ILLINOIS (contd.)

Hardin County (contd.)

Radioactive Black Shale

Road cut in SW$\frac{1}{4}$,SE$\frac{1}{4}$,SE$\frac{1}{4}$ Sec. 30, T. 11 S., R. 8 E.: sample of New Albany shale gave 0.003% eU: 1104.

Road cut in SE$\frac{1}{4}$,NE$\frac{1}{4}$,NE$\frac{1}{4}$ Sec. 31, T. 11 S., R. 8 E.: two samples of New Albany shale gave respectively 0.001% and 0.006% eU: 1104.

Stream cut in SW$\frac{1}{4}$,NW$\frac{1}{4}$,SE$\frac{1}{4}$ Sec. 25, T. 11 S., R. 7 E.: four samples of New Albany shale gave respectively 0.003, 0.003, 0.014, and 0.009% eU by radiometric assay while a chemical analysis of the New Albany shale, probably of the sample or samples with highest percent eU, gave 0.006% U_3O_8: 1104.

Radioactive Clays

Elizabethtown: red clay from a road cut on Route 146 gave 0.001% eU, while in Peters Creek fault red clay from sandstone gave 0.007% eU and from limestone, 0.001% eU, and green clay from shale gave 0.008% eU: 1096.

Hicks: red clay overlying a peridotite dike gave 0.003% eU while red clay in a stream bank gave 0.010% eU: 1096.

Hicks Dome

General: 37 samples of red clay from test pits, road cuts, trenches, the waste pile of Rose mine, and other similar sources gave from 0.000-0.144 % eU with an average of 0.011 % eU and 8 of the samples gave from 0.002-0.014% U_3O_8 with an average of 0.006% U_3O_8; 5 samples of yellow clay from similar sources including residual clay overlying Osage chert, gave from 0.048-0.155% eU with an average of 0.108% eU and 0.005-0.014% U_3O_8 with an average

ILLINOIS (contd.)

Hardin County (contd.)
Radioactive Clay
Hicks Dome
General:
of 0.010% U_3O_8; 2 samples of red and yellow clay averaged 0.079% eU and 0.020% U_3O_8; one gray clay sample gave 0.027% eU and 0.002% U_3O_8: 1096.
Humm's Wye: red clay near Stewart fault gave 0.004% eU: 1096.
Karbers Ridge Road: radioactive residual clay in road cut in Hardinsburg sandstone; radioactive material may have come from black shale in Chester formations: 1096.
Rosiclare: only one of two red clay samples over Soward breccia was radioactive and gave 0.004% eU, a yellow clay sample gave no eU; one of two samples of red clay from a cave-in at Rosiclare vein system was radioactive and gave 0.007% eU: 1096.
Sparks Hill: only 3 of 7 samples of red clay over the Sparks Hill breccia were radioactive and these gave 0.005, 0.007, and 0.007% eU: 1096.
Radioactive Rocks
Cave-in-Rock
Deardorf Fluorspar Mine: water collected from mine workings: aquifer, Mississippian limestone; Sample No. 5-7-1, residue showed 1.1 U ppm and 10 alpha cph for 9 mos., and water showed 0.4 U ppb, 8 eU ppb, and 5% U/eU: 796.
"Rd. Spring": artesian spring: aquifer, Mississippian limestone; Sample No. 5-4-1, residue showed 1.4 U ppm and 68 alpha cph for 9 mos., and water showed 0.6 U ppb, 58 eU ppb, and 1% U/eU: 796.
W. Green Fluorspar Mine: water collected from mine workings: aquifer, Mississippian limestone; Sample No. 5-6-9, residue showed 1.1 U ppm and 4 alpha cph for 9 mos., and water showed 0.18 U ppb 13 eU ppb, and 1% U/eU: 796.

ILLINOIS (contd.)

Hardin County (contd.)
Radioactive Rocks
Eichorn: two samples from a surface outcrop of explosion breccia of the Grant intrusive gave 0.001 and 0.004% eU; three samples of zinc ore from the Empire vein gave 0.000, 0.001, and 0.005% eU but fluorspar from the Douglas vein and lead and zinc deposits at Cave-in-Rock district and Rosiclare district had no eU: 1096.
Hicks: peridotite dike in a stream cut gave one sample with 0.009% eU and a second with 0.021% eU and 0.013% U_3O_8, while limestone inclusions from the dike gave 0.011% eU: 1096.
Hicks Dome
General: 4 samples of chert gave from 0.000-0.061% eU with an average of 0.018% eU and one sample gave 0.002% U_3O_8: 1096; 14 samples of chert breccia gave from 0.004-0.030% eU with an average of 0.010% eU and 4 of these samples gave 0.002-0.006% U_3O_8 with an average of 0.005% U_3O_8: 1096; 3 samples of explosion breccia gave from 0.002-0.008% eU with an average of 0.005% eU: 1096; a sample from a peridotite dike on Joiner farm gave 0.003% eU while a sample from a weathered peridotite dike on Robinson farm gave 0.001% eU: 1096; a sample from a limonite boulder gave 0.008% eU and a sample of calcite and fluorite gave 0.004% eU: 1096.
Henry Hamp, Jr. No. 1 well on Hicks Dome: test well for oil or gas begun by St. Joseph Lead Co. on Aug. 25, 1952, and abandoned at 2944 ft. on Nov. 27, 1952; well was collared in Clear Creek formation about 500 ft.

ILLINOIS (contd.)

Hardin County (contd.)
Radioactive Rocks
Hicks Dome
Henry Hamp, Jr. No. 1 well on Hicks Dome: stratigraphically below the New Albany shale, the oldest visible formation, and bottomed in the Ordovician in what should be the Knox Dolomite, except that the exact stratigraphic location is unknown because of the intense brecciation which confused the lithologic units in 1100 ft. of the hole: 680; the dome is a structural and physiographic high covering approximately 100 sq. mi., with an axis striking approximately N.50° W. and quaquaversal dips of up to 25°: 680; cuttings from the breccia were tested for possible radioactivity with the following results:
Sample 1, depth 1725-1750 ft., 0.029% eU, 0.001% U, scintillometer count 3X, 6.4% CaF_2.
Sample 2, depth 1785-1815 ft., 0.024% eU, 0.001% U, scintillometer count 3X-4X, 9.6% CaF_2.
Sample 3, depth 1975-2000 ft., 0.001% eU, no U % listed, scintillometer count slight, 1.3% CaF_2.
Sample 4, depth 2150-2175 ft., 0.016% eU, 0.001% U, scintillometer count 3X, 7.9% CaF_2.
Sample 5, depth 2370-2400 ft., 0.011% eU, 0.001% U, scintillometer count 2X-3X, 10.8% CaF_2.
Sample 6, depth 2425-2450 ft., 0.008% eU, 0.001% U, scintillometer count 2X-3X, 6.6% CaF_2.
Sample 7, depth 2450-2475 ft., 0.004% eU, no U% listed, scintillometer count 2X-3X, 4.6% CaF_2.
Sample 8, depth 2900-2925 ft., 0.001% eU, no U% listed, scintillometer count slight, 2.8% CaF_2; according to U.S.G.S. geologist, J.W. Hill, the amount of radioactivity in four samples is significant but lack of U shown in chemical analyses indicates that Ra, Th, or some other elements cause

ILLINOIS (contd.)

Hardin County (contd.)
Radioactive Rocks
Hicks Dome
Henry Hamp, Jr. No. 1 well on Hicks Dome: the radioactivity: 680; radiometric results from examination of additional cuttings of samples 1 and 2 by G. W. Bain at Amherst College were: Sample 2, initial 0.0403%, on storage 0.0389%, chemical 0.00087 %; Sample 2, initial 0.0439%, on storage 0.0338%, chemical 0.00093 %; Bain also says, while they were not equipped to test for Th, he believed the departure was not due to Th but to ionium or some other Ra group daughter: 680; final report of a detailed spectrographic analysis by the U.S.G.S. Denver laboratory of the 8 samples gave 0.X-% Th in sample Nos. 1 & 2, 0.0X+% Th in sample Nos. 4 & 5, a trace in sample Nos. 6 & 7, and zero in sample Nos. 3 & 8, concluding that the moderate radioactivity is caused largely by Th and is not of commercial significance at this time: 680; origin of the radioactivity may be related either to the association of extensive fluorite mineralization, since radioactivity seems to decrease downward in the breccia with decrease in fluorite content, or to the formerly overlying New Albany shale, derivation from which would require surprisingly deep downward circulation of groundwater or mineralizing solution in the breccia: 680; radioactive explosion breccia ranging from 0.01-0.03% eU; low U content found by chemical analysis may mean U does not cause the radioactivity here: 1096.
Rosiclare: three samples of a surface outcrop of explosion breccia on Soward farm gave

ILLINOIS (contd.)

Hardin County (contd.)
Radioactive Rocks
Rosiclare:
0.003, 0.001, and 0.000% eU; a sample of a peridotite dike taken underground in the Rosiclare vein system gave 0.011% eU but a sample from a surface outcrop of a peridotite sill on Downeys Bluff gave no eU: 1096.
Alcoa Fluorspar Mine: water from mine workings; aquifer, Mississippian limestone; Sample No. 5-8-1, residue showed 1.9 U ppm and 13 alpha cph for 9 mos., and water showed 0.7 ppb, 10 eU ppb, and 7% U/eU: 796.
Rosiclare Fluorspar Mine: water from mine workings; aquifer, Mississippian limestone; Sample No. 5-3-2, residue showed 1.2 U ppm and 10 alpha cph for 9 mos., and water showed 0.25 U ppb, 4 eU ppb, and 6% U/eU: 796.
Sparks Hill: three samples of a surface outcrop of explosion breccia from Sparks Hill plug were tested but only one was radioactive and gave 0.007%eU; shale from a spar prospect dump gave 0.008% eU: 1096.
Radioactive Shale
Stream cut in SW$\frac{1}{4}$,NW$\frac{1}{4}$,SE$\frac{1}{4}$ Sec. 25, T. 11 S., R. 7 E.: sample of New Albany shale gave 0.003% eU: 1104.
Radioactive Waters
General: five samples of water (4 from mine workings and 1 from an artesian spring) tested for radioactivity; four samples from mine workings ranged from 1.1 to 1.9 U ppm in residue, and their waters, from 0.18 to 0.7 U ppb, 4 to 13 eU ppb, and 1 to 7% U/eU; the artesian spring sample showed 1.4 U ppm in residue

ILLINOIS (contd.)

Hardin County (contd.)
Radioactive Waters
General:
and its water showed 0.6 U ppb, 58 eU ppb, and 1% U/eU; residue used was obtained by evaporation of waters and its radioactivity was measured in alpha counts per hour using scintillation counters: 796.
Silica Rocks, Uranium-bearing
General: 4 samples of chert gave from 0.000-0.061% eU with an average of 0.018% eU, and one sample gave 0.002% U_3O_8; 14 samples of chert breccia gave from 0.004-0.030% eU with an average of 0.010% eU, and 4 of these samples gave 0.002-0.006% U_3O_8 with an average of 0.005% U_3O_8: 1096.
Samples from Sec. 30, T. 11 S., R. 8 E.: three samples of chert breccia from a test pit gave respectively 0.018, 0.030, and 0.014% eU and 0.002, 0.004, and 0.006% U_3O_8; chert breccia from a boulder in a gully gave 0.019% eU and 0.006% U_3O_8; soft weathered chert from a bulldozer trench gave 0.061% eU and 0.002% U_3O_8: 1096.
Uranium Occurrences
Hicks, Area in NW$\frac{1}{4}$, SE$\frac{1}{4}$,SE$\frac{1}{4}$ Sec. 23, T. 11 S., R. 7 E. near: sample from a peridotite dike gave 0.021% eU and 0.013% U_3O_8: 1096.
Hicks Dome
General: 4 samples of chert gave from 0.000-0.061% eU with an average of 0.018% eU, and one sample gave 0.002% U_3O_8; 14 samples of

ILLINOIS (contd.)

Hardin County (contd.)
Uranium Occurrences
Hicks Dome
General:
chert breccia gave from 0.004-0.030% eU with an average of 0.010% eU, and 4 of these samples gave 0.002-0.006% U_3O_8 with an average of 0.005% U_3O_8: 1096; 37 samples of red clay from test pits, road cuts, trenches, the waste pile of Rose mine, and other similar sources gave from 0.000-0.144% eU with an average of 0.011% eU, and 8 of the samples gave from 0.002-0.014% U_3O_8 with an average of 0.006% U_3O_8; 5 samples of yellow clay from similar sources, including residual clay overlying Osage chert, gave from 0.048-0.155% eU with an average of 0.108% eU, and 0.005-0.014% U_3O_8 with an average of 0.010% U_3O_8; 2 samples of red and yellow clay averaged 0.079% eU and 0.020% U_3O_8; one gray clay sample gave 0.027% eU and 0.002% U_3O_8: 1096.

Henry Hamp, Jr. No. 1 well:
radioactive explosion breccia gave from 0.01-0.03% eU; low uranium content found by chemical analysis may mean that U does not cause the radioactivity here: 1096.

Outcrop in a creek in Sec. 25, T. 11 S., R. 7 E.: three of five samples of New Albany shale gave respectively 0.024, 0.022, and 0.022% eU and 0.007, 0.005, and 0.007% U_3O_8, while two others gave only 0.005 and 0.010% eU: 1096.

Road cut in Sec. 24, T. 11 S., R. 7 E.: red clay gave 0.019% eU and 0.007% U_3O_8: 1096.

Roadside ditch in Sec. 25, T. 11 S., R. 7 E.: red clay gave 0.021% eU and 0.009% U_3O_8: 1096.

ILLINOIS (contd.)

Hardin County (contd.)
Uranium Occurrences
Hicks Dome
Samples from Sec. 30, T. 11 S., R. 8 E.: two samples of red clay from a gully gave respectively 0.144 and 0.080% eU, and 0.014 and 0.004% U_3O_8; three samples of yellow clay from the same gully gave respectively 0.132, 0.080, and 0.125% eU and 0.010, 0.007, and 0.005% U_3O_8; red clay in test pit, 5 ft. deep, gave 0.013% eU and 0.003% U_3O_8; a red clay from a bulldozer trench gave 0.015% eU and 0.006% U_3O_8, while two samples of red and yellow clay from the same trench gave 0.081 and 0.077% eU and 0.018 and 0.023% U_3O_8; two samples of red clay from a test pit gave 0.016 and 0.027% eU and 0.002 and 0.006% U_3O_8; a gray clay from a bulldozer trench gave 0.027% eU and 0.002% U_3O_8; a brown clay from 2 ft. below the surface (1 in. auger hole) gave 0.016% eU and 0.004% U_3O_8; a yellow clay in a bulldozer trench gave 0.155% eU and 0.014% U_3O_8, while the -2 micron fraction of the same clay gave 0.251% eU and 0.019% U_3O_8; a red clay from 1 ft. below the surface gave 0.029% eU and 0.006% U_3O_8; and a yellow clay from a bulldozer trench gave 0.048% eU and 0.013% U_3O_8: 1096.

Samples from Sec. 30, T. 11 S., R. 8 E.: three samples of chert breccia from a test pit gave respectively 0.018, 0.030, and 0.014% eU and 0.002, 0.004, and 0.006% U_3O_8; chert breccia from a boulder in a gully gave 0.019% eU and 0.006% U_3O_8;

ILLINOIS (contd.)

Hardin County (contd.)
Uranium Occurrences
Hicks Dome
Samples from Sec. 30 (contd.)
soft weathered chert from a bulldozer trench gave 0.061% eU and 0.002% U_3O_8; 1096.
Stream cut in SW¼,NW¼,SE¼ Sec. 25, T. 11 S., R. 7 E.: four samples of New Albany shale gave respectively 0.003, 0.003, 0.014, and 0.009% eU by radiometric assay, while a chemical analysis of the New Albany shale, probably made on the sample or samples with the highest eU, gave 0.006% U_3O_8: 1104.
Black Shales, Uranium-bearing
Hicks Dome
Outcrop in a creek in Sec. 25, T. 11 S., R. 7 E.: three of five samples of New Albany shale gave respectively 0.024, 0.022, and 0.022% eU and 0.007, 0.005, and 0.007% U_3O_8, while two others gave only 0.005 and 0.010% eU: 1096.
Stream cut in SW¼,NW¼,SE¼ Sec. 25, T. 11 S., R. 7 E.: four samples of New Albany shale gave respectively 0.003, 0.003, 0.014, and 0.009% eU by radiometric assay, while a chemical analysis of the New Albany shale, probably made on the sample or samples with the highest eU, gave 0.006% U_3O_8: 1104.
Clays, Uranium-bearing
Hicks Dome
General: 37 samples of red clay from test pits, road cuts, trenches, the waste pile of Rose mine, and other similar sources gave from 0.000-0.144% eU with an average of 0.011% eU, and 8 of the samples gave from 0.002-0.014% U_3O_8 with an average of 0.006% U_3O_8; 5 samples of yellow clay from similar sources, including residual clay overlying Osage chert, gave from 0.048-0.155%

ILLINOIS (contd.)

Hardin County (contd.)
Uranium Occurrences
Clays, Uranium-bearing
Hicks Dome
General:
eU with an average of 0.108% eU, and 0.005-0.014% U_3O_8 with an average of 0.010% U_3O_8; 2 samples of red and yellow clay averaged 0.079% eU and 0.020% U_3O_8; one gray clay sample gave 0.027% eU and 0.002% U_3O_8: 1096.
Road cut in Sec. 24, T. 11 S., R. 7 E.: red clay gave [illegible] 0.019% eU and 0.007% U_3O_8: 1096.
Roadside ditch in Sec. 25, T. 11 S., R. 7 E.: red clay gave 0.021% eU and 0.009% U_3O_8: 1096.
Samples from Sec. 30, T. 11 S., R. 8 E.: two samples of red clay from a gully gave respectively 0.144 and 0.080% eU and 0.014 and 0.004% U_3O_8; three samples of yellow clay from the same gully gave respectively 0.132, 0.080, and 0.125% eU and 0.010, 0.007, and 0.005% U_3O_8; red clay in test pit, 5 ft. deep, gave 0.013% eU and 0.003% U_3O_8; a red clay from a bulldozer trench gave 0.015% eU and 0.006% U_3O_8 while two samples of red and yellow clay from the same trench gave 0.081 and 0.077% eU and 0.018 and 0.023% U_3O_8; two samples of red clay from a test pit gave 0.016 and 0.027% eU and 0.002 and 0.006% U_3O_8; a gray clay from a bulldozer trench gave 0.027% eU and 0.002% U_3O_8; a brown clay from 2 ft. below the surface (1 in. auger hole) gave 0.016% eU and 0.004% U_3O_8;

ILLINOIS (contd.)

Hardin County (contd.)
Uranium Occurrences
Clays, Uranium-bearing
Hicks Dome
Samples from Sec. 30, T.11 S., R. 8 E.: a yellow clay in a bulldozer trench gave 0.155% eU and 0.014% U_3O_8 while the -2 micron fraction of the same clay gave 0.251% eU and 0.019% U_3O_8; a red clay from 1 ft. below the surface gave 0.029% eU and 0.006% U_3O_8; and a yellow clay from a bulldozer trench gave 0.048% eU and 0.013% U_3O_8: 1096.
Igneous Rocks, Uranium-bearing
Hicks, Area in NW$\frac{1}{4}$,SE$\frac{1}{4}$,SE$\frac{1}{4}$ Sec. 23, T. 11 S., R. 7 E. near: sample from a peridotite dike gave 0.021% eU and 0.013% U_3O_8: 1096.
Hicks Dome
Henry Hamp, Jr. No. 1 well: radioactive explosion breccia gave from 0.01-0.03% eU; low uranium content found by chemical analysis may mean that U does not cause the radioactivity here: 1096.
Silica Rocks, Uranium-bearing
Hicks Dome
*Samples from Sec. 30, T. 11 S., R. 8 E.: three samples of chert breccia from a test pit gave respectively 0.018, 0.030, and 0.014% eU and 0.002, 0.004, and 0.006% U_3O_8; chert breccia from a boulder in a gully gave 0.019% eU and 0.006% U_3O_8; soft weathered chert from a bulldozer trench gave 0.061% eU and 0.002% U_3O_8: 1096.
*General: 4 samples of chert gave from 0.000-0.061% eU with an average of 0.018% eU, and one sample gave 0.002% U_3O_8; 14 samples of chert breccia gave from 0.004-0.030% eU with an average of 0.010% eU, and 4 of these samples gave 0.002-0.006% U_3O_8 with an average of 0.005% U_3O_8: 1096.

ILLINOIS (contd.)

Hardin County (contd.)
Uranium Occurrences
Waters, Uranium-bearing
General: five samples of water (4 from mine workings and 1 from an artesian spring) tested for radioactivity: 4 samples from mine workings ranged from 1.1 to 1.9 U ppm in residue, and their waters, from 0.18 to 0.7 U ppb, 4 to 13 eU ppb, and 1 to 7% U/eU; the artesian spring sample showed 1.4 U ppm in residue and its water showed 0.6 U ppb, 58 eU ppb, and 1% U/eU; residue used was obtained by evaporation of water and its radioactivity was measured in alpha counts per hour using scintillation counters: 796.
Cave-in-Rock
Deardorf Fluorspar Mine: water collected from mine workings: aquifer, Mississippian limestone; Sample No. 5-7-1, residue showed 1.1 U ppm and 10 alpha cph for 9 mos., and water showed 0.4 U ppb, 8 eU ppb, and 5% U/eU: 796.
"Rd. Spring": artesian spring: aquifer, Mississippian limestone; Sample No. 5-4-1, residue showed 1.4 U ppm and 68 alpha cph for 9 mos., and water showed 0.6 U ppb, 58 eU ppb, and 1% U/eU: 796.
W. Green Fluorspar Mine: water collected from mine workings: aquifer, Mississippian limestone; Sample No. 5-6-9, residue showed 1.1 U ppm and 4 alpha cph for 9 mos., and water showed 0.18 U ppb, 13 eU ppb, and 1% U/eU: 796.

ILLINOIS (contd.)

Hardin County (contd.)
Uranium Occurrences
Waters, Uranium-bearing
Rosiclare
Alcoa Fluorspar Mine: water from mine workings: aquifer, Mississippian limestone; Sample No. 5-8-1, residue showed 1.9 U ppm and 13 alpha cph for 9 mos., and water showed 0.7 U ppb, 10 eU ppb, and 7% U/eU: 796.
Rosiclare Fluorspar Mine: water from mine workings: aquifer, Mississippian limestone; Sample No. 5-3-2, residue showed 1.2 U ppm and 10 alpha cph for 9 mos., and water showed 0.25 U ppb, 4 eU ppb, and 6% U/eU: 796.
Waters, Uranium-bearing
General: five samples of water (4 from mine workings and 1 from an artesian spring) tested for radioactivity: 4 samples from mine workings ranged from 1.1 to 1.9 U ppm in residue, and their waters, from 0.18 to 0.7 U ppb, 4 to 13 eU ppb, and 1 to 7% U/eU; the artesian spring sample showed 1.4 U ppm in residue and its water showed 0.6 U ppb, 58 eU ppb, and 1% U/eU; residue used was obtained by evaporation of water and its radioactivity was measured in alpha counts per hour using scintillation counters: 796.
Cave-in-Rock
Deardorf Fluorspar Mine: water collected from mine workings: aquifer, Mississippian limestone; Sample No. 5-7-1, residue showed 1.1 U ppm, and 10 alpha cph for 9 mos., and water showed 0.4 U ppb, 8 eU ppb, and 5% U/eU: 796.
"Rd. Spring": artesian spring: aquifer Mississippian limestone; Sample No. 5-4-1, residue showed 1.4 U ppm and 68 alpha cph for 9 mos., and water showed 0.6 U ppb, 58 eU ppb, and 1% U/eU: 796.

ILLINOIS (contd.)

Hardin County (contd.)
Waters, Uranium-bearing
Cave-in-Rock
W. Green Fluorspar Mine: water collected from mine workings: aquifer, Mississippian limestone; Sample No. 5-6-9, residue showed 1.1 U ppm and 4 alpha cph for 9 mos., and water showed 0.18 U ppb, 13 eU ppb, and 1% U/eU: 796.
Rosiclare
Alcoa Fluorspar Mine: water from mine workings: aquifer, Mississippian limestone; Sample No. 5-8-1, residue showed 1.9 U ppm and 13 alpha cph for 9 mos., and water showed 0.7 U ppb, 10 eU ppb, and 7% U/eU: 796.
Rosiclare Fluorspar Mine: water from mine workings: aquifer, Mississippian limestone; Sample No. 5-3-2, residue showed 1.2 U ppm and 10 alpha cph for 9 mos., and water showed 0.25 U ppb, 4 eU ppb, and 6% U/eU: 796.

Henderson County
Monazite Occurrences
Mississippi River sands: monazite and xenotime, both very rare: 823.
Thorium Occurrences
Mississippi River sands: monazite and xenotime, both very rare: 823.
Xenotime Occurrences
Mississippi River sands: monazite and xenotime, both very rare: 823.

ILLINOIS (contd.)

Henry County

Radioactive Black Shale

Mine dump in SE$\frac{1}{4}$,NW$\frac{1}{4}$,SE$\frac{1}{4}$ Sec. 11, T. 14 N., R. 1 E.: sample of Seville and Curlew shales from below limestone gave 0.006% eU: 1104.

Mine dump in NE$\frac{1}{4}$,NE$\frac{1}{4}$,NE$\frac{1}{4}$ Sec. 33, T. 14 N., R. 1 E.: sample of Seville and Curlew shales gave 0.004% eU: 1104.

Igneous Rocks, Uranium-bearing

See under individual county names and under Index III, Uranium Occurrences-Illinois: 1096.

ILLINOIS (contd.)

Jackson County

Radioactive Black Shale

Carbondale quadrangle

Cooksie Coal Co. pits in NE$\frac{1}{4}$ Sec. 36, T. 9 S., R. 1 W.: radioactivity of coal in Makanda formation at three different pits: first locality, a medium to bright coal and its underlying thin interbedded sheets of clay and coal, both showed less than 0.001% eU; first pit, in coal stratigraphically higher than that found at the first locality, a black to dark gray shale and its underlying pyritic coal, both showed less than 0.001% eU; and second pit, coal stratigraphically higher than that at first pit, weathered and with no thick partings except an 0.1 ft.-thick discontinuous parting one ft. from base, showed less than 0.001% eU: 894.

Mine entry in SE$\frac{1}{4}$,NW$\frac{1}{4}$,NW$\frac{1}{4}$ Sec. 35, T. 8 S., R. 1 W.: sample of Summum shale above No. 4 coal gave 0.008% eU: 1104.

Stream cut in NW$\frac{1}{4}$,SE$\frac{1}{4}$,NE$\frac{1}{4}$ Sec. 4, T. 7 S., R. 4 W.: sample of unnamed shale above Campbell Hill coal gave 0.003% eU: 1104.

Stream cut in SW$\frac{1}{4}$,NW$\frac{1}{4}$,NW$\frac{1}{4}$ Sec. 33, T. 10 S., R. 1 W.: a black sample of Battery Rock shale at the position of Battery Rock coal showed no eU while a gray to dark gray sample of the same shale, taken below the Battery Rock coal, gave 0.001% eU: 1104.

Strip mine in NE$\frac{1}{4}$,SW$\frac{1}{4}$,NE$\frac{1}{4}$ Sec. 36, T. 9 S., R. 1 W.: a black shale sample of an unnamed shale above Murphysboro coal gave 0.001% eU while a dark gray sample of the same shale gave 0.003% eU: 1104.

ILLINOIS (contd.)

Jackson County (contd.)
Radioactive Clay
Carbondale quadrangle
Cooksie Coal Co. pits in NE¼ Sec. 36, T. 9 S., R. 1 W.: radioactivity of coal in Makanda formation at three different pits: first locality, a medium to bright coal and its underlying thin interbedded sheets of clay and coal, both showed less than 0.001% eU; first pit, in coal stratigraphically higher than that at first locality, a black to dark gray shale and its underlying weathered, pyritic coal, both showed less than 0.001% eU; and second pit, coal stratigraphically higher than that at first pit, weathered, and with no thick partings except an 0.1 ft. thick discontinuous parting 1 ft. from base, less than 0.001% eU: 894.
Murphysboro quadrangle
Burning Star No. 1 drift mine of Truax-Traer Coal Co. in SW¼ Sec. 31, T. 7 S., R. 1 W.: radioactivity of coal and clay in Herrin No. 6 coal, starting with upper layer: non-radioactive gray claystone; medium to bright coal, less than 0.001% eU; clay parting (Blue Band), less than 0.001% eU; and medium to bright coal, less than 0.001% eU: 894.
Radioactive Coal
Carbondale quadrangle
Cooksie Coal Co. pits in NE¼ Sec. 36, T. 9 S., R. 1 W.: radioactivity of coal in Makanda formation at three different pits: first locality, a medium to bright coal and its underlying thin interbedded sheets of clay and coal, both showed less than 0.001% eU; first pit, in coal stratigraphically higher than that at first locality, a black to dark gray shale and its underlying weathered, pyritic coal, both showed less than 0.001% eU;

ILLINOIS (contd.)

Jackson County (contd.)
Radioactive Coal
Carbondale quadrangle
Cooksie Coal Co. pits in NE¼ Sec. 36, T. 9 S., R. 1 W.: and second pit, coal stratigraphically higher than that at first pit, weathered, and with no thick partings except an 0.1 ft. thick discontinuous parting 1 ft. from base, less than 0.001% eU: 894.
Murphysboro quadrangle
Burning Star No. 1 drift mine of Truax-Traer Coal Co. in SW¼ Sec. 31, T. 7 S., R. 1 W.: radioactivity of coal and clay in Herrin No. 6 coal, starting with upper layer: non-radioactive gray claystone; medium to bright coal, less than 0.001% eU; clay parting (Blue Band), less than 0.001% eU; and medium to bright coal, less than 0.001% eU: 894.
Burning Star No. 1 strip mine of Truax-Traer Coal Co. in SE¼ Sec. 35, T. 7 S., R. 2 W.: radioactivity of shale and coal in Harrisburg No. 5 coal, starting with upper layer: non-radioactive gray clay; carbonaceous shale, less than 0.001% eU; medium bright attrital coal, two layers separated by pyritic parting, each of three layers showed less than 0.001% eU: 894.
Radioactive Rocks
Carbondale quadrangle
Cooksie Coal Co. pits in NE¼ Sec. 36, T. 9 S., R. 1 W.: radioactivity of coal in Makanda formation at three different pits: first locality, a medium to bright coal and its underlying thin interbedded sheets of clay and coal, both showed less than 0.001% eU; first pit, in coal

ILLINOIS (contd.)

Jackson County (contd.)
Radioactive Rocks
Carbondale quadrangle
Cooksie Coal Co. pits in NE¼ Sec. 36, T. 9 S., R. 1 W.: stratigraphically higher than at first locality, a black to dark gray shale and its underlying weathered, pyritic coal, both showed less than 0.001% eU; and second pit, coal stratigraphically higher than that at first pit, weathered, and with no thick partings except an 0.1 ft. thick discontinuous parting 1 ft. from base, less than 0.001% eU: 894.
Murphysboro quadrangle
Burning Star No. 1 strip mine of Truax-Traer Coal Co. in SE¼ Sec. 35, T. 7 S., R. 2 W.: radio activity of shale and coal in Harrisburg No. 5 coal, starting with upper layer: non-radioactive gray clay; carbonaceous shale showed less than 0.001% eU; medium bright attrital coal, two layers separated by pyritic parting each of 3, less than 0.001% eU: 894.
Radioactive Shale
Stream cut in SW¼,SE¼,NE¼ Sec. 19, T. 9 S., R. 2 W.: sample of gray to dark gray Grindstaff shale above Willis coal gave 0.003% eU: 1104.
Stream cut in SW¼,NW¼,NW¼ Sec. 33, T. 10 S., R. 1 W.: a black sample of Battery Rock shale at the position of Battery Rock coal showed no eU while a gray to dark gray sample of the same shale taken below the Battery Rock coal gave 0.001% eU: 1104.
Stream cut in SE¼,SE¼,NE¼ Sec. 35, T. 7 S., R. 4 W.: sample of gray to dark gray "Ava" shale gave 0.003% eU: 1104.
Strip mine in NE¼,SW¼,NE¼ Sec. 36, T. 9 S., R. 1 W.: a black shale sample of an unnamed shale above Murphysboro coal gave 0.001% eU while a gray to dark gray sample

ILLINOIS (contd.)

Jackson County (contd.)
Radioactive Shale
Strip mine in NE¼,SW¼,NE¼ Sec. 36, T. 9 W., R. 1 W.: of the same shale gave 0.003% eU: 1104.

Jefferson County
Black Shales, Uranium-bearing
Road cut in NW¼,SW¼,SE¼ Sec. 22, T. 1 S., R. 3 E.: sample of unnamed shales of Pennsylvanian age above McLeansboro coal gave 0.011% eU by radiometric assay and 0.012% U_3O_8 by chemical analysis: 1104.
Radioactive Black Shale
Du Quoin quadrangle
Chicago-Wilmington and Farmington Coal Co. diamond drill core from SW¼ Sec. 9, T. 4 S., R. 1 E.: radioactivity of shale and coal in Harrisburg No. 5 coal, starting with upper layer: hard black shale, 0.005% eU; hard black shale, 0.009% eU; medium to bright coal, less than 0.001% eU: 894.
Road cut in NW¼,SW¼,SW¼ Sec. 7, T. 1 S., R. 4 E.: sample of unnamed shale of Pennsylvanian age above coal that crops out near town of Divide gave 0.003 % eU: 1104.
Road cut in NW¼,SW¼,SW¼ Sec. 22, T. 1 S., R. 3 E.: sample of unnamed shales of Pennsylvanian age above McLeansboro coal gave 0.011% eU by radiometric assay and 0.012% U_3O_8 by chemical analysis: 1104.
Stream cut in NE¼,NE¼,SE¼ Sec. 35, T. 4 S., R. 4 E.: sample of unnamed shales of Pennsylvanian age above McLeansboro coal gave 0.001% eU: 1104.

ILLINOIS (contd.)

Jefferson County (contd.)

Radioactive Black Shale

Stream cut in SE¼,SE¼,SE¼ Sec. 13, T. 3 S., R. 3 E.: sample of unnamed shale of Pennsylvanian age above coal that crops out near town of Divide showed no eU: 1104.

Stream cut in SE¼,SW¼,SE¼ Sec. 7, T. 1 S., R. 3 E.: sample of unnamed shales of Pennsylvanian age above McLeansboro coal gave 0.005% eU: 1104.

Radioactive Coal

Du Quoin quadrangle

Chicago-Wilmington and Farmington Coal Co. shaft mine in NW¼ Sec. 11, T. 4 S., R. 1 E.: radioactivity of Herrin No. 6 coal, two coal layers separated by a gray shale, (Blue Band), less than 0.001% eU in each of the three layers: 894.

Chicago-Wilmington and Farmington Coal Co. diamond drill core from SW¼ Sec. 9, T. 4 S., R. 1 E.: radioactivity of shale and coal in Harrisburg No. 5 coal, starting with upper layer: hard black shale, 0.005% eU; hard black shale, 0.009% eU; medium to bright coal, less than 0.001% eU: 894.

Radioactive Rocks

Well in Sec. 26, T. 4 S., R. 2 E.: Aux Vase formation mixture of silt and lime with some shale, from 2651 - 56 ft. depth, radioactivity less than 2 x 10^{-12}g, Ra/g. rock; McClosky oolitic limestone from 2794 - 2804 ft. depth, radioactivity 2.1 ± 1.8 x 10^{-12}g, Ra/g. rock: 929; relationship of radioactivity of sample to organic content and sedimentation studied: 928.

Well in Sec. 34, T. 5 S., R. 6 E.: sandstone from unknown depth, radioactivity 4.2 ± 1.8 x 10^{-12}g. Ra/g. rock: 929; relationship of radioactivity of sample to organic content and sedimentation studied: 928.

ILLINOIS (contd.)

Jefferson County (contd.)

Radioactive Shale

DuQuoin quadrangle

Chicago-Wilmington and Farmington Coal Co. diamond drill core from SW¼ Sec. 9 T. 4 S., R. 1 E.: radioactivity of shale and coal in Harrisburg No. 5 coal, starting with upper layer: hard black shale, 0.005% eU; hard black shale, 0.009% eU; medium to bright coal, less than 0.001% eU: 894.

Chicago-Wilmington and Farmington Coal Co. shaft mine in NW¼ Sec. 11, T. 4 S., R. 1 E.: radioactivity of Herrin No. 6 coal occurring as two coal layers separated by a gray shale (Blue Band), less than 0.001% eU in each of the three layers: 894.

Stream cut in SE¼,SE¼SE¼ Sec. 13, T. 3 S., R. 3 E.: sample of unnamed gray to dark-gray shale of Pennsylvanian age above coal that crops out near town of Divide gave 0.003% eU: 1104.

Well in Sec. 35, T. 2 S., R. 1 E.: Cypress shale sample at top of Benoist sand at 1954-63 ft. depth, radioactivity 6.9 ± 1.8 x 10^{-12}g. Ra/g. rock: 929; relationship of radioactivity of sample to organic content and sedimentation studied: 928.

Uranium Occurrences

Road cut in NW¼,SW¼,SE¼ Sec. 22, T. 1 S., R. 3 E.: sample of unnamed shales of Pennsylvanian age above McLeansboro coal gave 0.011% eU by radiometric assay and 0.012% U_3O_8 by chemical analysis: 1104.

ILLINOIS (contd.)

Jefferson County (contd.)
Uranium Occurrences
Black Shales, Uranium-bearing
Road cut in NW¼,SW¼,SW¼ Sec. 22, T. 1 S., R. 3 E.: sample of unnamed shales of Pennsylvanian age above McLeansboro coal gave 0.011% eU by radiometric assay and 0.012% U_3O_8 by chemical analysis: 1104.

Jersey County
Radioactive Shale
Stream cut in NE¼,SE¼,Sec. 4, T. 6 N., R. 12 W.: two samples of gray to dark gray shales of the Maple Mill member (black-shale facies) of the Kinderhook series, one above the other: upper sample gave 0.007% eU and lower sample, 0.008% eU: 1104.
Valley wall in SW¼,SE¼,NW¼ Sec. 34, T. 8 N., R. 13 W.: three samples of gray to dark gray shale of the Maple Mill member (black-shale facies) of the Kinderhook series, taken from the base of the formation and listed in ascending order gave 0.004, 0.004, and no % eU: 1104.

Jo Davies County
Radioactive Shale
Railroad cut in NE¼,SE¼. SW¼ Sec. 26, T. 29 N., R. 2 E.: a gray to dark gray sample of Maquoketa shale from the "Depauperate zone" near base of the formation gave 0.002% eU: 1104.

Johnson County
Black Shales, Uranium-bearing
Stream cut in SE¼,NE¼,SE¼ Sec. 33, T. 11 S., R. 4 E.: sample of Pounds shale at the position of the Reynoldsburg coal gave 0.012% eU by radiometric assay and 0.001% U_3O_8 by chemical analysis: 1104.
Radioactive Black Shale
Stream cut in SE¼,NE¼,SE¼ Sec. 33, T. 11 S., R. 4 E.: sample of Pounds shale at the position of the Reynoldsburg coal gave 0.012% eU by

ILLINOIS (contd.)

Johnson County (contd.)
Radioactive Black Shale
Stream cut in SE¼,NE¼,SE¼ Sec. 33, T. 11 S., R. 4 E.: radiometric assay and 0.001% U_3O_8 by chemical analysis: 1104.
Radioactive Coal
Sample from SW¼,NW¼ Sec. 35, T. 11 S., R. 4 E.: cannel coal just above Caseyville conglomerate (Pennsylvanian), radioactivity 3.3 + - 1.8 x 10^{-12}g. Ra/g. rock: 929; relationship of radioactivity of sample to organic content and sedimentation studied: 928.
Radioactive Shale
Railroad cut in NE¼,SW¼,NE¼ Sec. 36, T. 12 S., R. 4 E.: a gray to dark gray sample of Menard shale gave 0.003% eU: 1104.
Railroad cut in SE¼,SE¼,NW¼ Sec. 34, T. 8 N., R. 13 W.: a gray to dark gray sample of Menard shale from a lower level in the formation than that in Sec. 36 gave 0.001% eU: 1104.
Uranium Occurrences
Stream cut in SE¼,NE¼,SE¼ Sec. 33, T. 11 S., R. 4 E.: sample of Pounds shale at the position of the Reynoldsburg coal gave 0.012 % eU by radiometric assay and 0.001% U_3O_8 by chemical analysis: 1104.
Black Shales, Uranium-bearing
Stream cut in SE¼,NE¼,SE¼ Sec. 33, T. 11 S., R. 4 E.: sample of Pounds shale at the position of the Reynoldsburg coal gave 0.012% eU by radiometric assay and 0.001% U_3O_8 by chemical analysis: 1104.

Knox County
Radioactive Black Shale
Strip mine in S¼ Sec. 8, T. 9 N., R. 4 E.: sample of St. David shale above No. 5 coal gave 0.008% eU: 1104.

ILLINOIS (contd.)

LaSalle County

Black Shales, Uranium-bearing

Stream cut in SE¼,SW¼ Sec. 8, T. 32 N., R. 2 E.: sample of Liverpool shale above No. 2 coal gave 0.008% eU by radiometric assay and 0.003% U_3O_8 by chemical analysis: 1104

Radioactive Black Shale

Road cut in SE¼,SE¼,SE¼ Sec. 9, T. 31 N., R. 3 E.: sample of Brereton shale above No. 6 coal showed no eU: 1104.

Stream cut in NE¼,NE¼,NE¼ Sec. 3, T. 33 N., R. 1 E.: sample of Liverpool shale above No. 2 coal gave 0.002% eU: 1104.

Stream cut in SE¼,SW¼ Sec. 8, T. 32 N., R. 2 E.: sample of Liverpool shale above No. 2 coal gave 0.008% eU by radiometric assay and 0.003% U_3O_8 by chemical analysis: 1104.

Stream cut in SW¼,SE¼,NE¼ Sec. 21, T. 33 N., R. 5 E.: sample of St. David shale above No. 5 coal gave 0.004% eU: 1104.

Stream cut in SW¼,SE¼ Sec. 32, T. 32 N., R. 3 E.: sample of Summum shale above No. 4 coal gave 0.007% eU: 1104.

Uranium Occurrences

Stream cut in SE¼,SW¼ Sec. 8, T. 32 N., R. 2 E.: sample of Liverpool shale above No. 2 coal gave 0.008% eU by radiometric assay and 0.003% U_3O_8 by chemical analysis: 1104.

Black Shales, Uranium-bearing

Stream cut in SE¼,SW¼ Sec. 8, T. 32 N., R. 2 E.: sample of Liverpool shale above No. 2 coal gave 0.008% eU by radiometric assay and 0.003% U_3O_8 by chemical analysis: 1104.

Logan County

Radioactive Shale

Blocks from quarry floor in SW¼,NE¼, NE¼ Sec. 7, T. 19 N., R. 3 W.: a gray to dark gray sample of Gimlet shale below Lonsdale limestone showed no eU: 1104.

ILLINOIS (contd.)

McHenry County

Monazite Occurrences

West Chicago: monazite, very rare, in sands: 823.

Thorium Occurrences

West Chicago: monazite, very rare, in sands: 823.

Macoupin County

Black Shale, Uranium-bearing

Stream cut in SW¼,NE¼,NE¼ Sec. 12, T. 7 N., R. 7 W.: sample of Macoupin shale above Macoupin coal gave 0.003% eU and phosphatic bands in this sample gave 0.065% eU by radiometric assay and 0.075% U_3O_8 by chemical analysis: 1104.

Radioactive Black Shale

Stream cut in SW¼,NE¼,NE¼ Sec. 12, T. 7 N., R. 7 W.: sample of Macoupin shale above Macoupin coal gave 0.003% eU and phosphatic bands in this sample gave 0.065% eU by radiometric assay and 0.075% U_3O_8 by chemical analysis: 1104.

Stream cut in NW¼,SW¼,NW¼ Sec. 16, T. 12 N., R. 9 W.: sample of Gimlet shale above lower Scottville coal gave 0.006% eU: 1104.

Stream cut in SE¼,SE¼,SW¼ Sec. 35, T. 10 N., R. 7 W.: sample of Macoupin shale above Macoupin coal gave 0.006% eU: 1104.

Stream cut in SW¼,SW¼,SE¼ Sec. 35, T. 10 N., R. 7 W.: sample of Shoal Creek shale below Shoal Creek limestone gave 0.004% eU: 1104.

Uranium Occurrences

Stream cut in SW¼,NE¼,NE¼ Sec. 12, T. 7 N., R. 7 W.: sample of Macoupin shale above Macoupin coal gave 0.003% eU and phosphatic bands in this sample gave 0.065% eU by radiometric assay and 0.075% U_3O_8 by chemical analysis: 1104.

Black Shale, Uranium-bearing

Stream cut in SW¼,NE¼,NE¼ Sec. 12, T. 7 N., R. 7 W.: sample of Macoupin shale above Macou-

ILLINOIS (contd.)

Macoupin County (contd.)
Uranium Occurrences
Black Shale, Uranium-bearing
Stream cut in SW¼,NE¼,NE¼ Sec. 12, T. 7 N., R. 7 W.: pin coal gave 0.003% eU and phosphatic bands in this sample gave 0.065% eU by radiometric assay and 0.075% U_3O_8 by chemical analysis: 1104.

Marion County
Radioactive Rocks
Well in Sec. 35, T. 4 N., R. 1 E.: Cypress sandstone sample from 1360-65 ft. depth, radioactivity less than 2 x 10^{-12}g. Ra/g. rock: 929; relationship of radioactivity of sample to organic content and sedimentation studied: 928.

Menard County
Radioactive Black Shale
Stream cut in center of NW¼,NW¼ Sec. 36, T. 18 N., R. 9 W.: sample of Sparland shale above No. 7 coal gave 0.005% eU: 1104.

Monazite Occurrences
See under individual county names and under Index III, Thorium Occurrences Illinois: 823.

Montgomery County
Radioactive Black Shale
Stream cut in SW¼,SW¼,SW¼ SE¼ Sec. 21, T. 7 N., R. 4 W.: sample of Shoal Creek shale below Shoal Creek limestone gave 0.009% eU: 1104.
Stream cut in NE¼,SE¼,NW¼ Sec. 28, T. 10 N., R. 3 W.: sample of Macoupin shale above Macoupin coal gave 0.004% eU: 1104.

Peoria County
Radioactive Black Shale
Road cut in NE¼,NE¼,SW¼ Sec. 11, T. 8 N., R. 7 E.: sample of Sparland shale above No. 7 coal gave 0.006% eU: 1104.

ILLINOIS (contd.)

Peoria County (contd.)
Radioactive Black Shale
Road cut in center of SE¼ Sec. 23, T. 7 N., R. 7 E.: sample of Sparland shale above No. 7 coal gave 0.002% eU: 1104.
Road cut in NE¼,SW¼ Sec. 28, T. 9 N., R. 6 E.: sample of Sparland shale above No. 7 coal gave 0.002% eU: 1104.
Stream cut in center of NE¼ Sec. 3, T. 8 N., R. 5 E.: sample of Gimlet shale above Exline limestone gave 0.003% eU: 1104.

Perry County
Radioactive Black Shale
Pinckneyville quadrangle
Truax - Traer Coal Co. Mine No. 2, a strip mine, in SE¼ Sec. 26, T. 5 S., R. 2 W.: radioactivity of coal and shale in Herrin No. 6 coal, starting with upper layer: non - radioactive limestone; black shale, 0.006% eU; medium to bright coal, less than 0.001% eU; gray shale with interbedded coal-clay sheets, less than 0.001% eU; bright coal, less than 0.001 % eU; gray clay, less than 0.001% eU; and bright coal, less than 0.001% eU: 894.
Radioactive Clay
Pinckneyville quadrangle
Truax-Traer Coal Co. Mine No. 2, a strip mine, in SE¼ Sec. 26, T. 5 S., R. 2 W.: radioactivity of coal and shale in Herrin No. 6 coal, starting with upper layer: non-radioactive limestone; black shale, 0.006% eU; medium to bright coal, less than 0.001% eU; gray shale with interbedded coal-clay sheets, less than 0.001% eU; bright coal, less than 0.001% eU; gray clay, less than 0.001% eU; and bright coal, less than 0.001% eU; 894.

ILLINOIS (contd.)

Perry County (contd.)

Radioactive Coal

Pinckneyville quadrangle

Truax-Traer Coal Co. Mine No. 2, a strip mine, in SE¼ Sec. 26, T. 5 S., R. 2 W.: radioactivity of coal and shale in Herrin No. 6 coal, starting with upper layer: non-radioactive limestone; black shale, 0.006% eU; medium to bright coal, less than 0.001% eU; gray shale with interbedded coal-clay sheets, less than 0.001% eU; bright coal, less than 0.001% eU; gray clay, less than 0.001% eU; and bright coal, less than 0.001% eU: 894.

Radioactive Shale

Pinckneyville quadrangle

Truax-Traer Coal Co. Mine No. 2, a strip mine, in SE¼ Sec. 26, T. 5 S., R. 2 W.: radioactivity of coal and shale in Herrin No. 6 coal, starting with upper layer: non-radioactive limestone; black shale, 0.006% eU; medium to bright coal, less than 0.001% eU; gray shale with interbedded coal-clay sheets, less than 0.001% eU; bright coal, less than 0.001% eU; gray clay, less than 0.001% eU; and bright coal, less than 0.001 % eU: 894.

Pike County

Radioactive Shale

Road cut in center of NW¼,NE¼ Sec. 24, T. 7 S., R. 4 W.: two samples of gray to dark gray shale of the Hannibal formation, one at base of outcrop and the other between 0-3 and 4-7 ft. above, both gave 0.003% eU: 1104.

Stream cut in NE¼,SW¼ Sec. 17, T. 6 S., R. 5 W.: two samples of gray to dark gray shale in the Grassy Creek formation, one above the other: upper sample gave 0.008% eU and lower sample, 0.003% eU: 1104.

ILLINOIS (contd.)

Pope County

Clays, Uranium-bearing

Herod, Area in SE¼,SE¼,NW¼ Sec. 14, T. 11 S., R. 7 E.: red clay as 0.5 in. vertical "veins" in wall of a trench gave 0.563% eU and 0.010% U_3O_8: 1096.

Radioactive Black Shale

Railroad cut in NW¼,SW¼,SE¼ Sec. 19, T. 12 S., R. 5 E.: a sample of black shale from the Clore formation showed no eU: 1104.

Railroad cut in SE¼,SE¼,SW¼ Sec. 19, T. 12 S., R. 5 E.: three samples of shale tested from Clore formation; two black samples gave 0.006 and no % eU and one gray to dark gray sample showed no eU: 1104.

Railroad cut in SW¼,NW¼,SE¼ Sec. 19, T. 12 S., R. 5 E.: (one) sample of shale from the Clore formation gave 0.002% eU while a second sample from the base of the formation gave 0.003% eU: 1104; sample of Clore shale from top of formation gave 0.002 % eU: 1104.

Railroad cut in NW¼,SW¼,SW¼ Sec. 30, T. 12 S., R. 5 E.: a sample of shale taken at the contact of the Clore and Palestine formations gave 0.008% eU while a sample taken from below in the Palestine formation gave 0.006% eU: 1104.

Road cut in SE¼,SE¼,SE¼ Sec. 11, T. 13 S., R. 6 E.: a sample of Tar Springs shale gave 0.001% eU: 1104

Radioactive Clay

Herod: 4 samples of yellow clay gave from 0.003-0.037% eU and the underlying green shale, 0.005% eU; red and yellow clay gave 0.050% eU; a red clay sample as 0.5 in. vertical "veins" in wall of a trench gave 0.563% eU and 0.010% U_3O_8: 1096.

ILLINOIS (contd.)

Pope County (contd.)

Radioactive Rocks

Empire district: tests of lead, zinc, and fluorspar deposits showed virtually no radioactivity: 1096.

Golconda: tests on boulders from a peridotite dike showed no radioactivity: 1096.

Radioactive Shale

Railroad cut in SE$\frac{1}{4}$,SE$\frac{1}{4}$,SW$\frac{1}{4}$ Sec. 19, T. 12 S., R. 5 E.: three samples of shale tested from Clore formation; two black samples gave 0.006 and no % eU and one gray to dark gray sample showed no eU: 1104.

Uranium Occurrences

Herod, Area in SE$\frac{1}{4}$,SE$\frac{1}{4}$,NW$\frac{1}{4}$ Sec. 14, T. 11 S., R. 7 E.: red clay as 0.5 in. vertical "veins" in wall of a trench gave 0.563% eU and 0.010% U_3O_8: 1096.

Clays, Uranium-bearing

Herod, Area in SE$\frac{1}{4}$,SE$\frac{1}{4}$,NW$\frac{1}{4}$ Sec. 14, T. 11 S., R. 7 E.: red clay as 0.5 in. vertical "veins" in wall of a trench gave 0.563% eU and 0.010% U_3O_8: 1096.

ILLINOIS (contd.)

Pulaski County

Monazite Occurrences

Cretaceous sands: eight samples examined with following results: three contained monazite and xenotime, both very rare; one contained monazite, rare, and xenotime, very rare; two contained only monazite, the first in rare amounts and second in very rare amounts; two contained only xenotime, very rare in both: 823.

Ohio River sands: monazite and xenotime, both very rare: 823.

Thorium Occurrences

Cretaceous sands: eight samples examined with following results: three contained monazite and xenotime, both very rare; one contained monazite, rare, and xenotime, very rare; two contained only monazite, the first in rare amounts and the second in very rare amounts; two contained only xenotime, very rare in both: 823.

Ohio River sands: monazite and xenotime, both very rare: 823.

Xenotime Occurrences

Cretaceous sands: eight samples examined with following results: three contained monazite and xenotime, both very rare; one contained monazite, rare, and xenotime, very rare; two contained only monazite, the first in rare amounts and second in very rare amounts; two contained only xenotime, very rare in both: 823.

Ohio River sands: monazite and xenotime, both very rare: 823.

Radioactive Black Shale

See under individual county names and under Index III, Radioactive Black Shale-Illinois: 819, 928, 929, 1096, 1104.

Radioactive Clay

See under individual county names and under Index III, Radioactive Clay-Illinois: 894, 1096.

ILLINOIS (contd.)

Radioactive Coal

See under individual county names and under Index III, Radioactive Coal-Illinois: 894, 928, 929.

Radioactive Fluorite

See under individual county names and under Index III, Radioactive Fluorite-Illinois: 928, 929.

Radioactive Rocks

See under individual county names and under Index III, Radioactive Rocks-Illinois: 680, 819, 894, 996, 1096.

Radioactive Shale

See under individual county names and under Index III, Radioactive Shale-Illinois: 894, 996, 1104.

Radioactive Waters

See under individual county names and under Index III, Radioactive Waters-Illinois: 796.

Randolph County

Radioactive Black Shale

Coulterville quadrangle

Southwestern Illinois Coal Co. strip mine in NW¼ Sec. 36, T. 5 S., R. 5 W.: radioactivity of shale and coal from Herrin No. 6 coal, starting with upper layer: carbonaceous shale, grab sample from dump, 0.006% eU; medium to bright coal with several thin clay partings, less than 0.001% eU; two medium bright attrital coals each underlain by clay parting, all taken together, less than 0.001% eU; and medium coal, less than 0.001% eU: 894.

ILLINOIS (contd.)

Randolph County (contd.)

Radioactive Black Shale

Quarry in SW¼,SE¼,SE¼ Sec. 2, T. 8 S., R. 6 W.: two samples of shale taken 25 and 27.5 ft. below the top of the Clore formation gave respectively 0.002 and 0.009% eU: 1104.

Stream cut in SW¼,NE¼,SE¼ Sec. 33, T. 7 S., R. 6 W.: two samples of shale from the Clore formation: the first from the base of the formation gave 0.003% eU and the second from 25 ft. above the base gave 0.004% eU: 1104.

Stream cut in NW¼,NW¼,NE¼ Sec. 32, T. 7 S., R. 6 W.: one sample of shale taken at the contact of the Menard-Waltersburg formations gave 0.006% eU while 3 samples of shale from the Waltersburg formation, one above the other and listed in ascending order, gave respectively 0.007, 0.005, and 0.001% eU: 1104.

Strip mine in NE¼,SW¼,NE¼ Sec. 36, T. 5 S., R. 5 W.: one sample of Jamestown shale above Jamestown limestone gave 0.001% eU but two samples of Brereton shale above Herrin limestone showed no eU: 1104.

Radioactive Clay

Coulterville quadrangle

Southwestern Illinois Coal Co. strip mine in NW¼ Sec. 36, T. 5 S., R. 5 W.: radioactivity of shale and coal from Herrin No. 6 coal, starting with upper layer: carbonaceous shale, grab sample from dump, 0.006% eU; medium to bright coal with several thin clay partings, less than 0.001% eU; two medium bright attrital coals, each underlain by clay parting, all taken together, less than 0.001% eU; and medium coal, less than 0.001% eU: 894.

ILLINOIS (contd.)

Randolph County (contd.)

Radioactive Coal

Coulterville quadrangle

Southwestern Illinois Coal Co. strip mine in NW¼ Sec. 36, T. 5 S., R. 5 W.: radioactivity of shale and coal from Herrin No. 6 coal, starting with upper layer: carbonaceous shale, grab sample from dump, 0.006% eU; medium to bright coal with several thin clay partings, less than 0.001% eU; two medium bright attrital coals, each underlain by clay parting, all taken together, less than 0.001% eU; and medium coal, less than 0.001% eU: 894.

Richland County

Radioactive Black Shale

Stream cut in SW¼,SW¼,SE¼ Sec. 15, T. 3 N., R. 10 E.: two samples of Bogota shale above Upper Bogota coal gave 0.006% eU and no eU: 1104.

Rock Island County

Radioactive Black Shale

Road cut in SE¼,SE¼,SW¼ Sec. 6, T. 16 N., R. 5 W.: four samples of Seville shale above the limestone gave 0.004 and 0.002% eU in two and no eU in the other two: 1104.

Stream cut in NE¼,NE¼,SW¼ Sec. 1, T. 16 N., R. 5 W.: six samples of Seville shale above the limestone gave 0.007, 0.004, 0.002, 0.004, 0.006, and 0.001% eU: 1104.

St. Clair County

Radioactive Black Shale

Strip mine in SE¼,SE¼,NW¼ Sec. 31, T. 1 N., R. 8 W.: a sample of Brereton shale above No. 6 coal gave 0.003% eU: 1104.

ILLINOIS (contd.)

St. Clair County (contd.)
Radioactive Coal
New Athens quadrangle
Reinheimer Slope Mine at Freeburg: radioactivity of shale and coal in Herrin No. 6 coal, starting with upper layer: hard carbonaceous shale, 0.007% eU; bright coal with thick vitrain bands, 0.001% eU; bright coal with thick vitrain bands and several thin clay partings, less than 0.001% eU: 894.
O'Fallon quadrangle
Belle Valley Coal Co. slope mine in SE¼ Sec. 26, T. 1 N., R. 8 W.: radioactivity of coal and shale in Herrin No. 6 coal; carbonaceous shale, 0.001% eU; underlying medium to bright coal with several thin clay partings, less than 0.001% eU: 894.
Waterloo quadrangle
Midwest Radiant Corp. strip mine at Millstadt: radioactivity of coal and rock in Herrin No. 6 coal, starting with upper layer: medium to bright coal with thin discontinuous clay partings, less than 0.001% eU; non-radioactive gray clay; black limestone from spoil pile, 0.001% eU: 894.
Radioactive Rock
New Athens quadrangle
Reinheimer Slope Mine at Freeburg: radioactivity of shale and coal in Herrin No. 6 coal, starting with upper layer: hard carbonaceous shale, 0.007% eU; bright coal with thick vitrain bands, 0.001% eU; bright coal with thick vitrain bands and several thin clay partings, less than 0.001% eU: 894.
O'Fallon quadrangle
Belle Valley Coal Co. slope mine in SE¼ Sec. 26, T. 1 N., R. 8 W.: radioactivity of coal and shale in Herrin No. 6 coal; carbonaceous shale, 0.001% eU; underlying

ILLINOIS (contd.)

St. Clair County (contd.)
Radioactive Rock
O'Fallon quadrangle
Belle Valley Coal Co. slope mine in SE¼ Sec. 26, T. N., R. 8 W.: medium to bright coal with several thin clay partings, less than 0.001% eU: 894.
Waterloo quadrangle
Midwest Radiant Corp. strip mine at Millstadt: radioactivity of coal and rock in Herrin No. 6 coal, starting with upper layer: medium to bright coal with thin discontinuous clay partings, less than 0.001% eU; non-radioactive gray clay; black limestone from spoil pile, 0.001% eU: 894.

Saline County
Black Shale, Uranium-bearing
Equality quadrangle
Unnamed strip mine, in SE¼ Sec. 14, T. 9 S., R. 7 E., abandoned recently, company unknown: radioactivity of black shale overlying Harrisburg No. 5 coal; grab sample from spoil pile of hard black shale, which fractures conchoidally and weathers to paper thin sheets, 0.018% eU and 0.0017 % U with 0.027% U in ash: 894.
Railroad cut in NW¼,NE¼,NE¼ Sec. 30, T. 10 S., R. 5 E.: sample of Stonefort shale above Stonefort limestone gave 0.013% eU by radiometric assay and 0.008 % U_3O_8 by chemical analysis while a sample of Stonefort shale below Stonefort limestone gave only 0.001% eU: 1104.
Stream cut in NE¼,SE¼,NE¼ Sec. 30, T. 10 S., R. 6 E.: sample of Davis shale above Davis coal gave 0.016% eU by radiometric assay and 0.009% U_3O_8 by chemical analysis, while a sample

ILLINOIS (contd.)

Saline County (contd.)
Black Shale, Uranium-bearing
Stream cut in NE¼,SE¼,NE¼ Sec. 30, T. 10 S., R. 6 E.: of Stonefort shale above Stonefort limestone gave only 0.004% eU: 1104.
Coal, Uranium-bearing
Harrisburg quadrangle
Sahara Coal Co. Mine No. 6 at Harrisburg: radioactivity of Herrin No. 6 coal in strip mine, starting with upper layer: bright attrital coal, 0.008% eU, and chemical analysis of sample gave 0.0085% U and of the ash, 0.125% U; bright to medium coal with thin pyritic partings, less than 0.001% eU: 894.
Radioactive Black Shale
Equality quadrangle
Beecher Williams' strip mine: radioactivity of black shales and coal in Davis (?) coal, starting with upper layer: non-radioactive gray shale; hard black shale, 0.005% eU; medium to bright coal, slightly weathered and with no thick partings, less than 0.001% eU; radioactivity of Dekoven(?) coal, a medium to bright coal, slightly weathered and with no thick partings, less than 0.001% eU: 894.
Unnamed strip mine, in SE¼ Sec. 14, T. 9 S., R. 7 E., abandoned recently, company unknown: radioactivity of black shale overlying Harrisburg No. 5 coal; grab sample from spoil pile of hard black shale, which fractures conchoidally and weathers to paper thin sheets, 0.018% eU and 0.0017% U, with 0.027% U in ash: 894
Harrisburg quadrangle
Saxton Coal Corp. strip mine at Carrier Mills: radioactivity of black shale and coal of the Davis (?) coal, starting with upper layer: hard black shale,

ILLINOIS (contd.)

Saline County (contd.)
Radioactive Black Shale
Harrisburg quadrangle
Saxton Coal Corp. strip mine at Carrier Mills: 0.006% eU; non-radioactive black shale layer; hard black shale, 0.004% eU; black pyritic shale, 0.002% eU; and bright coal, less than 0.001% eU: 894.
Railroad cut in NW¼,NE¼,NE¼ Sec. 30, T. 10 S., R. 5 E.: sample of Stonefort shale above Stonefort limestone gave 0.013% eU by radiometric assay and 0.008% U_3O_8 by chemical analysis while a sample of Stonefort shale below Stonefort limestone gave only 0.001% eU: 1104.
Stream cut in center of SW¼,NW¼ Sec. 10, T. 10 S., R. 7 E.: 2 samples of Liverpool shale above No. 2 coal gave 0.007 and 0.008% eU: 1104.
Stream cut in NE¼,SE¼,NE¼ Sec. 30, T. 10 S., R. 6 E.: sample of Davis shale above Davis coal gave 0.016% eU by radiometric assay and 0.009% U_3O_8 by chemical analysis while a sample of Stonefort shale above Stonefort limestone gave only 0.004% eU: 1104.
Stream cut in NE¼,NE¼,SW¼ Sec. 33, T. 7 S., R. 6 E.: sample of Shoal Creek shale below Shoal Creek limestone gave 0.007% eU: 1104.
Strip mine in NE¼,NW¼ Sec. 2, T. 10 S., R. 5 E.: sample of Dekoven shale above Dekoven coal gave 0.002% eU and a sample of Davis shale above Davis coal gave 0.007% eU: 1104.
Strip mine in SW¼,NE¼,SW¼ Sec. 29, T. 9 S., R. 5 E.: sample of Brereton shale above No. 6 coal gave 0.008% eU: 1104.

ILLINOIS (contd.)

Saline County (contd.)
Radioactive Coal
Equality quadrangle
Beecher Williams' strip mine: radioactivity of black shales and coal in Davis (?) coal, starting with upper layer: non-radioactive gray shale; hard black shale, 0.005% eU; medium to bright coal, slightly weathered and no thick partings, less than 0.001% eU; radioactivity of Dekoven(?) coal, a medium to bright coal, slightly weathered and with no thick partings, less than 0.001% eU: 894.
Harrisburg quadrangle
Sahara Coal Co. Mine No. 5 at Harrisburg: radioactivity of Harrisburg No. 5 coal from a slope mine, a medium bright attrital coal, less than 0.001% eU: 894.
Sahara Coal Co. Mine No. 6 at Harrisburg: radioactivity of Herrin No. 6 coal in strip mine, starting with upper layer: bright attrital coal, 0.008% eU, and chemical analysis of sample gave 0.0085 % U and of the ash, 0.125% U; bright to medium coal with thin pyritic partings, less than 0.001% eU: 894.
Saxton Coal Corp. strip mine at Carrier Mills: radioactivity of black shale and coal of the Davis (?) coal, starting with upper layer: hard black shale, 0.006% eU; non-radioactive black shale layer; hard blak shale, 0.004% eU; black pyritic shale, 0.002% eU; and bright coal, less than 0.001% eU: 894.
Uranium Occurrences
Equality quadrangle
Unnamed strip mine in SE$\frac{1}{4}$ Sec. 14, T. 9 S., R. 7 E., abandoned recently, company unknown: radioactivity of black shale overlying Harrisburg No. 5 coal; grab sample from spoil pile of hard black shale, which fractures conchoidally

ILLINOIS (contd.)

Saline County (contd.)
Uranium Occurrences
Equality quadrangle
Unnamed strip mine, in SE$\frac{1}{4}$ Sec. 14, T. 9 S., R. 7 E., abandoned recently, company unknown:
and weathers to paper thin sheets, 0.018% eU and 0.0017% U, with 0.027% U in ash: 894.
Harrisburg quadrangle
Sahara Coal Co. Mine No. 6 at Harrisburg: radioactivity of Herrin No. 6 coal in strip mine, starting with upper layer; bright attrital coal, 0.008% eU, and chemical analysis of sample gave 0.0085% U and of the ash, 0.125% U; bright to medium coal with thin pyritic patings, less than 0.001% eU: 894.
Railroad cut in NW$\frac{1}{4}$,NE$\frac{1}{4}$,NE$\frac{1}{4}$ Sec. 30, T. 10 S., R. 5 E.: sample of Stonefort shale above Stonefort limestone gave 0.013% eU by radiometric assay and 0.008% U_3O_8 by chemical analysis while a sample of Stonefort shale below Stonefort limestone gave only 0.001% eU: 1104.
Stream cut in NE$\frac{1}{4}$,SE$\frac{1}{4}$,NE$\frac{1}{4}$ Sec. 30, T. 10 S., R. 6 E.: sample of Davis shale above Davis coal gave 0.016% eU by radiometric assay and 0.009% U_3O_8 by chemical analysis, while a sample of Stonefort shale above Stonefort limestone gave only 0.004% eU: 1104.
Black Shale, Uranium-bearing
Equality quadrangle
Unnamed strip mine, in SE$\frac{1}{4}$ Sec. 14, T. 9 S., R. 7 E., abandoned recently, company unknown: radioactivity of black shale overlying Harrisburg No. 5 coal; grab sample from spoil pile of hard black shale, which

ILLINOIS (contd.)

Saline County (contd.)
Uranium Occurrences
Black Shale, Uranium-bearing
Equality quadrangle
Unnamed strip mine, in SE¼ Sec. 14, T. 9 S., R. 7 E., abandoned recently, company unknown: fractures conchoidally and weathers to paper thin sheets, 0.018% eU and 0.0017% U, with 0.027% U in ash: 894.
Railroad cut in NW¼,NE¼,NE¼ Sec. 30, T. 10 S., R. 5 E.: sample of Stonefort shale above limestone gave 0.013% eU by radiometric assay and 0.008 % U_3O_8 by chemical analysis while a sample of Stonefort shale below Stonefort limestone gave only 0.001% eU: 1104.
Stream cut in NE¼,SE¼,NE¼ Sec. 30, T. 10 S., R. 6 E.: sample of Davis shale above Davis coal gave 0.016 % eU by radiometric assay and 0.009% U_3O_8 by chemical analysis while a sample of Stonefort shale above Stonefort limestone gave only 0.004% eU: 1104.
Coal, Uranium-bearing
Harrisburg quadrangle
Sahara Coal Co. Mine No. 6 at Harrisburg: radioactivity of Herrin No. 6 coal in strip mine, starting with upper layer: bright attrital coal, 0.008% eU, and chemical analysis of sample gave 0.0085% U and of the ash, 0.125% U; bright to medium coal with thin pyritic partings, less than 0.001% eU: 894.

Sangamon County
Black Shale, Uranium-bearing
Stream cut in NW¼,NE¼,SW¼ Sec. 3, T. 13 N., R. 5 W.: sample of Shoal Creek shale below Shoal Creek limestone gave 0.014% eU by radiometric assay and 0.010% U_3O_8 by chemical analysis: 1104.

ILLINOIS (contd.)

Sangamon County (contd.)
Radioactive Black Shale
Stream cut in NW¼,NE¼,SW¼ Sec. 3, T. 13 N., R. 5 W.: sample of Shoal Creek shale below Shoal Creek limestone gave 0.014% eU by radiometric assay and 0.010% U_3O_8 by chemical analysis: 1104.
Uranium Occurrences
Stream cut in NW¼,NE¼,SW¼ Sec. 3, T. 13 N., R. 5 W.: sample of Shoal Creek shale below Shoal Creek limestone gave 0.014% eU by radiometric assay and 0.010% U_3O_8 by chemical analysis: 1104.
Black Shale, Uranium-bearing
Stream cut in NW¼,NE¼,SW¼ Sec. 3, T. 13 N., R. 5 W.: sample of Shoal Creek shale below Shoal Creek limestone gave 0.014% eU by radiometric assay and 0.010% U_3O_8 by chemical analysis: 1104.

Schuyler County
Black Shale, Uranium-bearing
Stream cut in center section of Sec. 36, T. 2 N., R. 1 W.: sample of Liverpool shale above No. 2 coal gave 0.011% eU by radiometric assay and 0.008% U_3O_8 by chemical analysis: 1104.
Radioactive Black Shale
Stream cut in center section of Sec. 36, T. 2 N., R. 1 W.: sample of Liverpool shale above No. 2 coal gave 0.011% eU by radiometric assay and 0.008% U_3O_8 by chemical analysis: 1104.
Uranium Occurrences
Stream cut in center section of Sec. 36, T. 2 N., R. 1 W.: sample of Liverpool shale above No. 2 coal gave 0.011% eU by radiometric assay and 0.008% U_3O_8 by chemical analysis: 1104.

ILLINOIS (contd.)

Schuyler County (contd.)
Uranium Occurrences
Black Shale, Uranium-bearing
Stream cut in center section of Sec. 36, T. 2 N., R. 1 W.: sample of Liverpool shale above No. 2 coal gave 0.011% eU by radiometric assay and 0.008% U_3O_8 by chemical analysis: 1104.

Shelby County
Radioactive Black Shale
Mine dump in NW¼,NW¼,NE¼ Sec. 14, T. 10 N., R. 6 E.: sample of Shelby shale above Trowbridge coal gave 0.002% eU: 1104.
Road ditch in NW¼,NE¼,SW¼ Sec. 22, T. 10 N., R. 6 E.: sample of Shelby shale about 10 ft. below Trowbridge coal gave 0.003% eU: 1104.

Shales, Uranium-bearing
See under individual county names and under Index III, Shales, Uranium-bearing-Illinois:-1104.

Silica Rocks, Uranium-bearing
See under individual county names and under Index III, Uranium Occurrences-Illinois: 1096.

Tazewell County
Radioactive Black Shale
Mine dump in NW¼,NE¼,SE¼,Sec. 24, T. 25 N., R. 5 W.: phosphatic bands and nodules in a sample of St. David shale above No. 5 coal gave 0.013% eU: 1104.
Stream cut in NE¼,NE¼,NW¼ Sec. 18, T. 25 N., R. 4 W.: sample of Sparland shale above No. 7 coal gave 0.004% eU: 1104.

Thorium Occurrences
See under individual county names and under Index III, Thorium Occurrences-Illinois: 823.

ILLINOIS (contd.)

Union County
Radioactive Black Shale
Road cut in NW¼,SE¼,SW¼ Sec. 26, T. 11 S., R. 1 W.: sample of a shale of the Mississippian Chester series, formation uncertain, gave 0.006% eU: 1104.
Radioactive Shale
General: Mountain Glen shale, radioactivity 58.7 + - 2.2 x 10^{-12}g. Ra/g. rock: 929; relationship of radioactivity of sample to organic content and sedimentation studied: 928.
Stream cut in SE¼,SW¼,SE¼ Sec. 33, T. 11 S., R. 1 E.: sample of shale in Clore formation showed no eU: 1104.
Stream cut in SE¼,NE¼,NE¼ Sec. 34, T. 11 S., R. 2 W.: sample of Mountain Glen shale at 35 ft. above the creek gave 0.007% eU while a second sample, from a cut bank, taken at the base of the formation gave 0.008% eU: 1104.
Stream cut in center of NE¼ Sec. 34, T. 11 S., R. 2 W.: sample of gray to dark gray Mountain Glen shale 10 ft. above base of formation gave 0.013% eU by radiometric assay and 0.013% U_3O_8 by chemical analysis; while three other samples taken at points between 10 and 30 ft. above the base of the formation and listed in ascending order gave respectively 0.011, 0.007, and 0.008% eU: 1104.
Valley wall in SW¼,NW¼,SE¼ Sec. 14, T. 12 S., R. 2 W.: five samples of Mountain Glen shale taken from upper 25 ft. of formation and listed in descending order gave respectively 0.005, 0.008, 0.008, 0.008, and 0.004 % eU: 1104.

ILLINOIS (contd.)

Union County (contd.)

Shale, Uranium-bearing

Stream cut in center of NE¼ Sec. 34, T. 11 S., R. 2 W.: sample of gray to dark gray Mountain Glen shale 10 ft. above base of formation gave 0.013% eU by radiometric assay and 0.013% U_3O_8 by chemical analysis; while three other samples taken at points between 10 and 30 ft. above the base of the formation and listed in ascending order gave respectively 0.011, 0.007, and 0.008% eU: 1104.

Uranium Occurrences

Stream cut in center of NE¼ Sec. 34, T. 11 S., R. 2 W.: sample of gray to dark gray Mountain Glen shale 10 ft. above base of formation gave 0.013% eU by radiometric assay and 0.013% U_3O_8 by chemical analysis; while three other samples taken at points between 10 and 30 ft. above the base of the formation and listed in ascending order gave respectively 0.011, 0.007, and 0.008% eU: 1104.

Shale, Uranium-bearing

Stream cut in center of NE¼ Sec. 34, T. 11 S., R. 2 W.: sample of gray to dark gray Mountain Glen shale 10 ft. above base of formation gave 0.013% eU by radiometric assay and 0.013% U_3O_8 by chemical analysis; while three other samples taken at points between 10 and 30 ft. above the base of the formation and listed in ascending order gave respectively 0.011, 0.007, and 0.008% eU: 1104.

Uranium Occurrences

See under individual county names and under Index III, Uranium Occurrences-Illinois: 426, 642, 796, 841, 883, 894, 1096, 1104, 1106.

ILLINOIS (contd.)

Uranium Processes

See under individual county names and under Index III, Uranium Processes-Illinois: 714, 1065, 1068.

Uranium Production

See under individual county names and under Index III, Uranium Production-Illinois: 714, 1065, 1068.

Vermilion County

Black Shale, Uranium-bearing

Stream cut in SW¼,NW¼,NW¼ Sec. 13, T. 18 N., R. 11 W.: sample of Summum shale above No. 4 coal gave 0.011% eU by radiometric assay and 0.014% U_3O_8 by chemical analysis while two gray to dark gray samples of the same shale gave 0.002 and 0.003% eU: 1104.

Radioactive Black Shale

Stream cut in SE¼,SE¼,SE¼ Sec. 6, T. 19 N., R. 11 W.: sample of Brereton shale above No. 6 coal gave 0.007% eU: 1104.

Stream cut in SW¼,NW¼,NW¼ Sec. 13, T. 18 N., R. 11 W.: sample of Summum shale above No. 4 coal gave 0.011% eU by radiometric assay and 0.014% U_3O_8 by chemical analysis while two gray to dark gray samples of the same shale gave 0.002 and 0.003% eU: 1104.

Stream cut in NW¼,NW¼,SW¼ Sec. 31, T. 19 N., R. 13 W.: sample of unnamed shale of Pennsylvanian age about 30 ft. below Livingston limestone gave 0.004 % eU: 1104.

Radioactive Coal

Danville quadrangle

Harmatton mine a strip pit, of Fairview Collieries Corp. in SE¼ Sec. 2, T. 19 N., R. 12 W.: radioactivity of a bright attrital coal with sparse thick

ILLINOIS (contd.)

Vermilion County (contd.)
Radioactive Coal
Danville quadrangle
Harmatton mine:
vitrain, between two non-radioactive gray shales, less than 0.001% eU: 894.
Ridge Farm quadrangle
Grape Creek Coal Co. strip mine in NW$\frac{1}{4}$ Sec. 2, T. 17 N., R. 11 W.: radioactivity of Grape Creek (No. 6?) coal, a medium to bright attrital coal containing thin fusain pyrite and shale partings, less than 0.001% eU: 894.
Radioactive Shale
Stream cut in SW$\frac{1}{4}$,NW$\frac{1}{4}$,NW$\frac{1}{4}$ Sec. 13, T. 18 N., R. 11 W.: sample of Summum shale above No. 4 coal gave 0.011% eU by radiometric assay and 0.014% U_3O_8 by chemical analysis, while two gray to dark gray samples of the same shale gave 0.002 and 0.003% eU: 1104.
Strip mine in SE$\frac{1}{4}$ Sec. 4, T. 19 N., R. 12 W.: sample of gray to dark gray Sparland shale above No. 7 coal gave 0.002% eU, while a sample from the top 3 in. of the shale gave 0.004% eU and one from the bottom inch gave 0.002% eU: 1104.
Uranium Occurrences
Stream cut in SW$\frac{1}{4}$,NW$\frac{1}{4}$,NW$\frac{1}{4}$ Sec. 13, T. 18 N., R. 11 W.: sample of Summum shale above No. 4 coal gave 0.011% eU by radiometric assay and 0.014% U_3O_8 by chemical analysis, while two gray to dark gray samples of the same shale gave 0.002 and 0.003% eU: 1104.

ILLINOIS (contd.)

Vermilion County (contd.)
Uranium Occurrences
Black Shale, Uranium-bearing
Stream cut in SW$\frac{1}{4}$,NW$\frac{1}{4}$,NW$\frac{1}{4}$ Sec. 13, T. 18 N., R. 11 W.: sample of Summum shale above No. 4 coal gave 0.011% eU by radiometric assay and 0.014% U_3O_8 by chemical analysis, while two gray to dark gray samples of the same shale gave 0.002 and 0.003% eU: 1104.

Washington County
Radioactive Rocks
Well in Sec. 10, T. 1 S., R. 1 W.: Benoist sandstone sample from 1521 ft. depth, radioactivity $3.9 \pm 1.8 \times 10^{-12}$ g. Ra/g. rock: 929; relationship of radioactivity of sample to organic content and sedimentation studied: 928.

Waters, Uranium-bearing
See under individual county names and under Index III, Waters, Uranium-bearing-Illinois: 796.

White County
Black Shale, Uranium-bearing
Stream cut in SW$\frac{1}{4}$,SW$\frac{1}{4}$ Sec. 21, T. 3 S., R. 14 W.: sample of Cohn shale above Cohn coal gave 0.007% eU while phosphatic nodules from the sample gave 0.019% eU by radiometric assay and 0.019% U_3O_8 by chemical analysis, and a sample of phosphatic siltstone above the Cohn coal gave 0.019% eU: 1104.
Radioactive Black Shale
Stream cut in SE$\frac{1}{4}$,SW$\frac{1}{4}$,SE$\frac{1}{4}$ Sec. 17, T. 7 S., R. 10 E.: sample of Shoal Creek shale below Shoal Creek limestone gave 0.005% eU: 1104.

ILLINOIS (contd.)

White County (contd.)

Radioactive Black Shale

Stream cut in SW$\frac{1}{4}$,SW$\frac{1}{4}$ Sec. 21, T. 3 S., R. 14 W.: sample of Cohn shale above Cohn coal gave 0.007% eU while phosphatic nodules from the sample gave 0.019% eU by radiometric assay and 0.019% U_3O_8 by chemical analysis, and a sample of phosphatic siltstone above the Cohn coal gave 0.019% eU: 1104.

Uranium Occurrences

Stream cut in SW$\frac{1}{4}$,SW$\frac{1}{4}$ Sec. 21, T. 3 S., R. 14 W.: sample of Cohn shale above Cohn coal gave 0.007% eU while phosphatic nodules from the sample gave 0.019% eU by radiometric assay and 0.019% U_3O_8 by chemical analysis, and a sample of phosphatic siltstone above the Cohn coal gave 0.019% eU: 1104.

Black Shale, Uranium-bearing

Stream cut in SW$\frac{1}{4}$,SW$\frac{1}{4}$ Sec. 21, T. 3 S., R. 14 W.: sample of Cohn shale above Cohn coal gave 0.007% eU while phosphatic nodules from the sample gave 0.019% eU by radiometric assay and 0.019% U_3O_8 by chemical analysis, and a sample of phosphatic siltstone above the Cohn coal gave 0.019% eU: 1104.

Will County

Uranium Processes

Blockson Chemical Co. plant at Joliet: first commercial plant for recovery of uranium as a by-product from treatment of phosphate rock from Florida: 714, 1065, 1068.

ILLINOIS (contd.)

Will County (contd.)

Uranium Production

Blockson Chemical Co. plant at Joliet: first commercial plant for recovery of uranium as a by-product from treatment of phosphate rock from Florida: 714, 1065, 1068.

Williamson County

Black Shale, Uranium-bearing

Strip mine in NE$\frac{1}{4}$,NE$\frac{1}{4}$ Sec. 28, T. 9 S., R. 4 E.: three samples of Brereton shale above No. 6 coal studied: the first, from the bottom 9 in. of the mine, gave 0.011% eU by radiometric assay and 0.006% U_3O_8 by chemical analysis; the second, from the upper 21 in. of the mine, gave 0.006% eU; the third consisting of random blocks of black shale containing phosphatic nodules and bands gave 0.011% eU: 1104.

Radioactive Black Shale

Marion quadrangle

Delta mine of Republic Coal and Coke Co. in SE$\frac{1}{4}$ Sec. 21, T. 9 S., R. 4 E.: radioactivity of shale and coal in Herrin No. 6 coal in a strip mine, starting with upper layer: non-radioactive shale; hard black shale, 0.005% eU; bright coal with very thin vitrain bands, 0.001% eU; and medium ~~bright~~ to dull coal, with thin vitrain bands and thin clay and pyrite partings, less than 0.001% eU: 894.

Road cut in SW$\frac{1}{4}$,SE$\frac{1}{4}$,NW$\frac{1}{4}$ Sec. 22, T. 10 S., R. 4 E.: sample of Stonefort shale above Stonefort limestone gave 0.012% eU: 1104.

ILLINOIS (contd.)

Williamson County (contd.)

Radioactive Black Shale

Road cut in NW¼, NE¼, SW¼ Sec. 30, T. 10 S., R. 4 E.: sample of Seville and Curlew shale below limestone gave 0.002% eU: 1104.

Stream cut in NE¼, SE¼, NE¼ Sec. 16, T. 10 S., R. 4 E.: sample of Davis shale above Davis coal gave 0.001% eU: 1104.

Stream cut in NW¼, SE¼, NW¼ Sec. 4, T. 10 S., R. 4 E.: sample of Summum shale above No. 4 coal gave 0.001% eU: 1104.

Stream cut in SE¼, SW¼, NW¼ Sec. 10, T. 9 S., R. 4 E.: sample of unnamed shale above Cutler Rider II coal gave 0.001% eU: 1104.

Strip mine in NE¼, SW¼ Sec. 4, T. 9 S., R. 2 E.: two samples of St. David shale above No. 5 coal gave 0.001 and 0.006% eU: 1104.

Strip mine in NE¼, NE¼ Sec. 28, T. 9 S., R. 4 E.: three samples of Brereton shale above No. 6 coal studied: the first, from the bottom 9 in. of the mine, gave 0.011% eU by radiometric assay and 0.006% U_3O_8 by chemical analysis; the second, from the upper 21 in. of the mine, gave 0.006% eU; the third consisting of random blocks of black shale containing phosphatic nodules and bands gave 0.011% eU: 1104.

Valley in NW¼, SW¼, NW¼ Sec. 16, T. 10 S., R. 4 E.: sample of Dekoven shale above Dekoven coal gave 0.006% eU: 1104.

West Frankfort quadrangle

Morgan Mines, Inc. strip mine in NW¼ Sec. 4, T. 9 S., R. 2 E.: radioactivity of black shale and coal in Harrisburg No. 5 coal starting with upper layer: lower foot of gray shale, 0.002% eU;

ILLINOIS (contd.)

Williamson County (contd.)

Radioactive Black Shale

West Frankfort quadrangle

Morgan Mines, Inc. strip mine: hard black shale, 0.003% eU; hard black shale, less than 0.001% eU; medium to bright attrital coal with numerous thin pyritic partings and calcite sheets along cleats, less than 0.001% eU: 894.

Morgan mines, Inc. strip mine in NW¼ Sec. 4, T. 9 S., R. 4 E.: radioactivity of shale and coal in Herrin No. 6 coal, starting with upper layer: non-radioactive gray shale; non-radioactive limestone; covered interval; black silty shale, less than 0.001% eU; coal, mainly bright, with some pyrite but no thick partings, less than 0.001% eU: 894.

Radioactive Coal

Harrisburg quadrangle

Delta Collieries Corp. abandoned strip mine in SE¼ Sec. 34, T. 9 S., R. 11 W.: radioactivity of an igneous dike and of samples of Harrisburg No. 5 coal collected 1 ft. E of dike at margin of strongly altered coal: igneous dike rock, 0.001% eU; two coals, both less than 0.001% eU and one underlying the other: 894.

Harrisburg Coal Co. slope mine in NE¼ Sec. 27, T. 9 S., R. 4 E.: radioactivity of Harrisburg No. 5 coal, a medium to bright coal underlain by non-radioactive gray shale and overlain by non-radioactive gray siltstone partially replaced by carbonaceous shale, less than 0.001% eU: 894.

Will Scarlet mine of Stonefort Coal Corp. in NW¼ Sec. 24, T. 10 S., R. 4 E.: radioactivity of Dekoven(?) coal in strip mine starting with upper layer: non-radioactive pink sandstone; bright coal, weathered and banded, less than 0.001% eU; non-radioactive gray clay; bright coal with thin vitrain bands, less than 0.001% eU: 894.

ILLINOIS (contd.)

Williamson County (contd.)
Radioactive Coal
Herrin quadrangle
Forsyth-Carterville Coal Co. strip mine in NW¼ Sec. 31, T. 8 S., R. 1 E.: radioactivity of shale and coal in Harrisburg No. 5 coal, starting with upper layer: non-radioactive limestone; carbonaceous shale, 0.002% eU; medium coal with some pyrite, sheets of calcite in cleats, and no thick partings, less than 0.001% eU: 894.
Marion quadrangle
Delta mine of Republic Coal and Coke Co. in SE¼ Sec. 21, T. 9 S., R. 4 E.: radioactivity of shale and coal in Herrin No. 6 coal in a strip mine, starting with upper layer: non-radioactive shale; hard black shale, 0.005% eU; bright coal with very thin vitrain bands, 0.001% eU; and medium bright to dull coal, with thin vitrain bands and thin clay and pyrite partings, less than 0.001% eU: 894.
Pinckneyville quadrangle
Truax-Traer Coal Co. Mine No. 2, a strip mine, in SE¼ Sec. 26, T. 5 S., R. 2 W.: radioactivity of coal and shale in Herrin No. 6 coal, starting with upper layer: non-radioactive limestone; black shale, 0.006% eU; medium to bright coal, less than 0.001% eU; gray shale with interbedded coal-clay sheets, less than 0.001% eU; bright coal, less than 0.001% eU; gray clay, less than 0.001% eU; and bright coal, less than 0.001% eU: 894.
West Frankfort quadrangle
Morgan Mines, Inc. strip mine in NW¼ Sec. 4, T. 9 S., R. 2 E.: radioactivity of black shale and coal in Harrisburg No. 5 coal, starting with upper layer: lower foot of gray shale, 0.002% eU;

ILLINOIS (contd.)

Williamson County (contd.)
Radioactive Coal
West Frankfort quadrangle
Morgan Mines, Inc. strip mine in NW¼ Sec. 4, T. 9 S., R. 2 E.:
hard black shale, 0.003% eU; hard black shale, less than 0.001% eU; medium to bright attrital coal with numerous thin pyritic partings and calcite sheets along cleats, less than 0.001% eU: 894.
Morgan Mines, Inc. strip mine in NW¼ Sec. 4, T. 9 S., R. 4 E.: radioactivity of shale and coal in Herrin No. 6 coal, starting with upper layer: non-radioactive gray shale; non-radioactive limestone; covered interval; black silty shale, less than 0.001% eU; coal, mainly bright, with some pyrite but no thick partings, less than 0.001% eU: 894.
Norris Coal Co. slope mine at Dogwatch: radioactivity of Harrisburg No. 5 coal, less than 0.001% eU in a medium bright coal with sparse, thin vitrain bands, brighter in top half of seam, and underlain and overlain by non-radioactive rocks: 894.
Radioactive Rocks
*Harrisburg quadrangle
Delta Collieries Corp. abandoned strip mine in SE¼ Sec. 34, T. 9 S., R. 11 W.: radioactivity of an igneous dike and of samples of Harrisburg No. 5 coal collected 1 ft. E of dike at margin of strongly altered coal: igneous dike rock, 0.001% eU; two coals, both less than 0.001% eU and one underlying the other: 894.
*Absher: only one of three samples of a peridotite dike in an exposure in a strip pit was radioactive and gave 0.003% eU: 1096.

ILLINOIS (contd.)

Williamson County (contd.)

Radioactive Rocks

Herrin quadrangle

Forsyth-Carterville Coal Co. strip mine in NW¼ Sec. 31, T. 8 S., R. 1 E.: radioactivity of shale and coal in Harrisburg No. 5 coal, starting with upper layer: non-radioactive limestone; carbonaceous shale, 0.002% eU; medium coal with some pyrite, sheets of calcite in cleats, and no thick partings, less than 0.001% eU: 894.

Marion quadrangle

Delta mine of Republic Coal and Coke Co. in SE¼ Sec. 21, T. 9 S., R. 4 E.: radioactivity of shale and coal in Herrin No. 6 coal in a strip mine, starting with upper layer: non-radioactive shale; hard black shale, 0.005% eU; bright coal with very thin vitrain bands, 0.001% eU; and medium bright to dull coal, with thin vitrain bands and thin clay and pyrite partings, less than 0.001% eU: 894.

West Frankfort quadrangle

Morgan Mines, Inc. strip mine in NW¼ Sec. 4, T. 9 S., R. 2 E.: radioactivity of black shale and coal in Harrisburg No. 5 coal, starting with upper layer: lower foot of gray shale, 0.002% eU; hard black shale, 0.003% eU; hard black shale, less than 0.001% eU; medium to bright attrital coal with numerous thin pyritic partings and calcite sheets along cleats, less than 0.001% eU: 894.

Morgan Mines, Inc. strip mine in NW¼ Sec. 4, T. 9 S., R. 4 E.: radioactivity of shale and coal in Herrin No. 6 coal, starting with upper layer: non-radioactive gray shale; non-radioactive limestone; covered interval; black silty shale, less than 0.001% eU; coal, mainly bright, with some pyrite but no thick partings, less than 0.001% eU: 894.

ILLINOIS (contd.)

Williamson County (contd.)

Uranium Occurrences

Strip mine in NE¼,NE¼ Sec. 28, T. 9 S., R. 4 E.: three samples of Brereton shale above No. 6 coal studied: the first, from the bottom 9 in. of the mine, gave 0.011% eU by radiometric assay and 0.006% U_3O_8 by chemical analysis; the second, from the upper 21 in. of the mine, gave 0.006% eU; the third consisting of random blocks of black shale containing phosphatic nodules and bands gave 0.011% eU: 1104.

Black Shales, Uranium-bearing

Strip mine in NE¼,NE¼ Sec. 28, T. 9 S., R. 4 E.: three samples of Brereton shale above No. 6 coal studied: the first, from the bottom 9 in. of the mine, gave 0.011% eU by radiometric assay and 0.006% U_3O_8 by chemical analysis; the second, from the upper 21 in. of the mine, gave 0.006% eU; the third, consisting of random blocks of black shale containing phosphatic nodules and bands, gave 0.011% eU: 1104.

Xenotime Occurrences

See under individual county names and under Index III, Xenotime Occurrences-Illinois: 823.

INDIANA

General

Black Shales, Uranium-bearing

General: uranium in black shales: 426; uranium-bearing black shale considered as low-grade, non-commercial deposits at the present time: 1106; uranium in Devonian and Mississippian New Albany black shale: 841.

New Albany shale: uranium: 443; uranium-bearing black shale considered as low-grade, non-commercial deposits at the present time: 1106.

Ohio and Albany black shales: uranium-bearing black shales similar to Chattanooga shale and containing only slightly less uranium: 883.

INDIANA (contd.)

General (contd.)

Carbonaceous Shale, Uranium-bearing

General: radioactivity of Gentryville coal in a roadcut 1.8 mi. S of Gentryville, and of the upper bench of Coal V and the shale above it at A.B.C. Coal Co. mine 3 mi. W of Linton and the Tecumseh Coal Corp. mine 6 mi. SE of Lynnville, and only the shale above it at Ayrshire Collieries Corp. mine 2 mi. NE of Winslow, appears to be due to uranium, which may have been accumulated in the plants that formed the coal, or may have been deposited in the coal after it was formed; the present study gave no conclusive evidence concerning the time of accumulation of uranium: 967.

Origin

General: radioactivity of Gentryville coal in a roadcut 1.8 mi. S of Gentryville, and of the upper bench of Coal V and the shale above it at A.B.C. Coal Co. mine 3 mi. W of Linton and the Tecumseh Coal Corp. mine 6 mi. SE of Lynnville, and only the shale

INDIANA (contd.)

General (contd.)
Carbonaceous Shale, Uranium-bearing
Origin
General:
above it at Ayrshire Collieries Corp. mine 2 mi. NE of Winslow appears to be due to uranium, which may have been deposited contemporaneously with the coal, may have accumulated in the plants that formed the coal, or may have been deposited in the coal after it was formed; the present study gave no conclusive evidence concerning the time of accumulation of uranium: 967.
Deposition of radioactive material:
radioactive matter apparently was deposited contemporaneously with shale, as indicated by wide areal extent of radioactivity in a stratigraphically limited shale unit, and the source of the radioactivity could be uranium in seawater; the darker colored shale containing abundant organic matter, made up at least in part of plant remains, appears to be the most radioactive and usually contains few or no invertebrate fossils indicating that plant debris may have made the water sufficiently acid to dissolve invertebrate shells or toxic to animals during the period of uranium accumulation: 967.
Coal, Uranium-bearing
General: radioactivity reconnaissance examination made of 175 samples of coal from 50 localities; radioactivity of 0.001% eU or greater was present in three coal beds, namely, the uncorrelated coal bed near Gentryville in Spencer County, the Minshall coal in Spencer County, and the top foot of the No. V coal in Warrick and Greene Counties; there are no reserves of the first two coals but, while the No. V coal is being mined and considerable reserves probably remain, the

INDIANA (contd.)

General (contd.)
Coal, Uranium-bearing
General:
radioactive part of it underlies only a small area: 996; radioactivity of Gentryville coal in a roadcut 1.8 mi. S of Gentryville and of the upper bench of Coal V and the shale above it at A.B.C. Coal Co. mine 3 mi. W of Linton and the Tecumseh Coal Corp. mine 6 mi. SE of Lynnville, and only the shale above it at Ayrshire Collieries Corp. mine 2 mi. NE of Winslow appears to be due to uranium, which may have been deposited contemporaneously with the coal, may have accumulated in the plants that formed the coal, or may have been deposited in the coal after it was formed; the present study gave no conclusive evidence concerning the time of accumulation of uranium: 967.
Origin
General: radioactivity of Gentryville coal in a roadcut 1.8 mi. S of Gentryville and of the upper bench of Coal V and the shale above it at A.B.C. Coal Co. mine 3 mi. W of Linton and the Tecumseh Coal Corp. mine 6 mi. SE of Lynnville, and only the shale above it at Ayrshire Collieries Corp. mine 2 mi. NE of Winslow appears to be due to uranium, which may have been deposited contemporaneously with the coal, may have accumulated in the plants that formed the coal, or may have been deposited in the coal after it was formed; the present study gave no conclusive evidence concerning the time of accumulation of uranium: 967.

INDIANA (contd.)

General (contd.)
Coal, Uranium-bearing
Origin
Location of radioactive coal beds: uranium in Gentryville coal could have been deposited by groundwater moving down through the sandstone above the coal while the source of the uranium could have been beds above the sandstone or the sandstone itself: 967; three samples of radioactive Coal V and one of Minshall coal occur at the top of the beds possibly indicating deposition of radioactive matter by groundwater after formation of the coal; while groundwater could have dissolved radioactive material from shale beds above coal, moved along joints and cracks in shale or along contact between coal and shale, and deposited material at the top of the coal bed, the latter is very well jointed while the shale is impermeable in many places: 967; radioactivity at top of Coal V probably at least partly indigenous to the coal instead of derived from shale above the coal since the shale was radioactive above the coal at all localities sampled while the coal was radioactive at only three localities; at two localities the coal had a high ash content so that uranium or other radioactive substances may be inherent in the fine grained detrital sediments deposited contemporaneously with the coal rather than in the organic matter: 967; radioactive sample of Coal VII occurs 0.6-1.6 ft. below top of coal bed, so radioactive material could have been concentrated at top of coal by groundwater and then leached down to this interval through cracks and joints in the coal: 967.

INDIANA (contd.)

General (contd.)
Monazite Occurrences
General: monazite: 1105.
Prospectors' Guides
Exploration methods: 1101.
Mining laws: 1101.
Uranium: 1101.
Radioactive Coal
Origin
General: radioactivity of Gentryville coal in a roadcut 1.8 mi. S of Gentryville and of the upper bench of Coal V and the shale above it at A.B.C. Coal Co. mine 3 mi. W of Linton and the Tecumseh Coal Corp. mine 6 mi. SE of Lynnville, and only the shale above it at Ayrshire Collieries Corp. mine 2 mi. NE of Winslow appears to be due to uranium, which may have been deposited contemporaneously with the coal, may have accumulated in the plants that formed the coal, or may have been deposited in the coal after it was formed; the present study gave no conclusive evidence concerning the time of accumulation of uranium: 967.
Location of radioactive coal beds: uranium in Gentryville coal could have been deposited by groundwater moving down through the sandstone above the coal while the source of the uranium could have been beds above the sandstone or the sandstone itself: 967; three samples of radioactive Coal V and one of Minshall coal occur at the top of the beds possibly indicating deposition of radioactive matter by groundwater after formation of the coal; while groundwater could have dissolved radioactive material from shale beds above coal, moved along joints and cracks

INDIANA (contd.)

General (contd.)
Radioactive Coal
Origin
Location of radioactive coal beds: in shale or along contact between coal and shale, and deposited material at top of the coal bed, the latter is very well jointed while the shale is impermeable in many places: 967; radioactivity at top of Coal V probably at least partly indigenous to the coal instead of derived from shale above the coal since the shale was radioactive above the coal at all localities sampled while the coal was radioactive at only three localities; at two localities the coal had a high ash content so that uranium or other radioactive substances may be inherent in the fine grained detrital sediments deposited contemporaneously with the coal rather than in the organic matter: 967; radioactive sample of Coal VII occurs 0.6-1.6 ft. below top of coal bed, so radioactive material could have been concentrated at top of coal by groundwater and then leached down to this interval through cracks and joints in the coal: 967.
Radioactive Shale
Origin
General: radioactivity of Gentryville coal in a roadcut 1.8 mi. S of Gentryville and of the upper bench of Coal V and the shale above it at A.B.C. Coal Co. mine 3 mi. W of Linton and the Tecumseh Coal Corp. mine 6 mi. SE of Lynnville, and only the shale above it at Ayrshire Collieries Corp. mine 2 mi. NE of Winslow appears to be due to uranium, which may have been deposited contemporaneously with the coal, may have accumulated in the plants that formed the coal, or may have been deposited in the coal after it was formed;

INDIANA (contd.)

General (contd.)
Radioactive Shale
Origin
General: the present study gave no conclusive evidence concerning the time of accumulation of uranium: 967.
Deposition of radioactive material: radioactive matter apparently was deposited contemporaneously with shale, as indicated by wide areal extent of radioactivity in a stratigraphically limited shale unit, and the source of the radioactivity could be uranium in seawater; the darker colored shale containing abundant organic matter, made up at least in part of plant remains, appears to be the most radioactive and usually contains few or no invertebrate fossils indicating that plant debris may have made the water sufficiently acid to dissolve invertebrate shells or toxic to animals during the period of uranium accumulation: 967.
Radioactive Springs
General: Ra emanation content varied from time to time and was reduced after heavy rains which carry emanation back down into the soil: 904; Ra emanation tended to increase as flow increased and to decrease as flow decreased: 904; two unnamed Indiana springs studied for a nine-month period confirmed these observations: 904.
Radioactivity
Amount: radioactivity is not great but is high compared with ordinary springs from some localities; variations occur from spring to spring probably because some emanation had been given up before they issued from the ground: 903.
Measurement: description of apparatus and methods used: 903.

INDIANA (contd.)
General (contd.)
Radioactive Springs
Radioactivity
Possible causes: radium emanation, picked up from traces of Ra in soil and rock through which water passes, dissolved in and passed out with the water; Ra salts dissolved in water; presence of some product of the Th or Ac series: 903.
Results reported: emanation content given for water as taken from spring or well: 903.
Radioactive Water
Radioactivity
Measurement: description of apparatus and methods used: 903.
Possible causes: radium emanation, picked up from traces of Ra in soil and rock through which water passes, dissolved in and passed out with the water; Ra salts dissolved in water; presence of some product of the Th or Ac series: 903.
Results reported: emanation content given for water as taken from spring or well: 903.
Thorium Occurrences
General: monazite: 1105.
Uranium Exploration
Methods: 1101.
Mining laws: 1101.
Prospectors' guide: 1101.
Uranium Occurrences
General: uranium in black shales: 426; uranium-bearing black shale considered as low-grade non-commercial deposits at the present time: 1106; uranium in Devonian and Mississippian New Albany black shale: 841; thin source strata in oil fields and oil shales may be potential sources of uranium: 642; radioactivity reconnaissance examination of 175 samples of coal from 50 localities; radioactivity of 0.001% eU or greater was present in three coal beds, namely, the uncorrelated coal bed near Gentryville in Spencer County, the Minshall coal bed in Spencer County, and the top foot of the No. V coal in Warrick

INDIANA (contd.)
General (contd.)
Uranium Occurrences
General:
and Greene Counties; there are no reserves of the first two coals but, while the No. V coal is being mined and considerable reserves probably remain, the radioactive part of it underlies only a small area: 996.
New Albany shale: uranium: 443; uranium-bearing black shale considered as low-grade, non-commercial deposits at the present time: 1106.
Ohio and Albany black shales: uranium-bearing black shales similar to Chattanooga shale and containing only slightly less uranium: 883.
Black Shale, Uranium-bearing
General: uranium in black shales: 426; uranium-bearing black shales considered as low-grade, non-commercial deposits at the present time: 1106; uranium in Devonian and Mississippian New Albany black shale: 841.
New Albany shale: uranium: 443; uranium-bearing black shale considered as low-grade, non-commercial deposits at the present time: 1106.
Ohio and Albany black shales: uranium-bearing black shales similar to Chattanooga shale and containing only slightly less uranium: 883.
Coals, Uranium-bearing
General: radioactivity reconnaissance examination of 175 samples of coal from 50 localities; radioactivity of 0.001% eU or greater was present in three coal beds, namely, the uncorrelated coal bed near Gentryville in Spencer County, the Minshall coal bed in Spencer County, and the top foot of the No. V coal in Warrick and Greene Counties; there are no reserves of the first two coals but, while the No. V coal is being mined and considerable reserves probably remain, the radioactive part of it underlies a small area: 996.

INDIANA (contd.)

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Carbonaceous Shales, Uranium-bearing

See under individual county names and under Index III, Carbonaceous Shales, Uranium-bearing-Indiana: 967.

Clay County

Radioactive Carbonaceous Shale

General: black shale above Coal IIIa reported in 1949 as showing radioactivity of 0.006% eU; exposures could not be found for checking for present report: 967.

Radioactive Coal

Ayrshire Collieries Corp. mine 1.5 mi. SW of Staunton, SW¼NE¼ Sec. 20, T. 12 N., R. 7 W., Clay City quadrangle: Coal III, top concealed in waste, showed radioactivity of less than 0.001% eU: 967.

Big Bend Collieries, Inc., mine 1 mi. E of Staunton, SE¼SE¼ Sec. 10, T. 12 N., R. 7 W.: Coal III showed radioactivity of less than 0.001% eU; Coal III - top split - 0.5 ft. above also showed radioactivity of less than 0.001% eU: 967.

Big Bend Collieries, Inc., mine 8 mi. S of Brazil, SE¼NW¼ Sec. 8, T. 11 N., R. 6 W., Clay City quadrangle: Upper Block coal showed radioactivity of less than 0.001% eU: 967.

Brown Coal Co. mine 5.5 mi. N of Clay City, SE¼NW¼ Sec. 32, T. 11 N., R. 6 W., Clay City quadrangle: Upper Block coal showed radioactivity of less than 0.001% eU: 967.

Gillespie Coal Co. mine 1 mi. SW of Clay City, NW¼NW¼ Sec. 31, T. 10 N., R. 6 W., Coal City quadrangle: Coal III-top split-showed radioactivity of less than 0.001% eU: 967.

Girton Coal Co. mine 2.6 mi. W of Carbon, NE¼NW¼ Sec. 2, T. 13 N., R. 7 W.: Upper Block coal showed radioactivity of less than 0.001%eU:967.

*Black Shales, Uranium-bearing

See under individual county names and under Index III, Black Shales, Uranium-bearing-Indiana: 426,443,841,883,1106.

Brown County

Radioactive Springs

Youno spring: temperature of water 16°C.; radioactivity, 355 x10^{-12}cur./l.:903.

INDIANA (contd.)

Clay County (contd.)

Radioactive Coal

Love Bros. mine 2.3 mi. N of Brazil, NE¼SW¼ Sec. 19, T. 13 N., R. 6 W.: Upper Block coal showed radioactivity of less than 0.001% eU: 967.

Mariah Collieries Corp. mine 1 mi. W of Coal City, NW¼SE¼ Sec. 10, T. 9 N., R. 6 W., Coal City quadrangle: Lower Block coal showed radioactivity of less than 0.001% eU; Upper Block coal, 24 ft. above it, showed radioactivity of 0.001% eU: 967.

Coal, Uranium-bearing

See under individual county names and under Index III, Coal, Uranium-bearing-Indiana: 967, 996.

Daviess County

Radioactive Coal

Hicks Coal Co. mine 2.6 mi. S of Cannelsburg, NW¼SW¼ Sec. 5, T. 2 N., R. 5 W.: Coal II showed radioactivity of less than 0.001% eU: 967.

Loogootee Block Coal Co. mine 2.5 mi. SW of Whitfield, SE¼SE¼ Sec. 15, T. 2 N., R. 5 W.: Coal II showed radioactivity of less than 0.001% eU: 967.

Fountain County

Radioactive Coal

Morgan Coal Co. mine 2.7 mi. NE of Kingman, SW¼SE¼ Sec. 20, T. 18 N., R. 7 W.: Minshall coal showed radioactivity of less than 0.001% eU: 967.

Gibson County

Radioactive Coal

Saxton Coal Co. mine 2 mi. SW of Oakland City, NE¼NE¼ Sec. 26, T. 2 S., R. 9 W., Petersburg quadrangle: Coal VII showed radioactivity of less than 0.001% eU: 967.

INDIANA (contd.)

Gibson County (contd.)
Radioactive Rocks
Well in Sec. 10, T. 3 S., R. 9 W.: Mansfield-Lower Pennsylvanian sandstone sample from 1059-60 ft. depth, radioactivity less than 2 x 10^{-12}g. Ra/g. rock: 929; relationship of radioactivity of sample to organic content and sedimentation studied: 928.
Radioactivity Determinations
Well in Sec. 10, T. 3 S., R. 9 W.: Mansfield-Lower Pennsylvanian sandstone sample from 1059-60 ft. depth, radioactivity less than 2 x 10^{-12}g. Ra/g. rock: 929.
Radioactivity Determinations
Radioactive Rocks
Well in Sec. 10, T. 3 S., R. 9 W.: Mansfield-Lower Pennsylvanian sandstone sample from 1059-60 ft. depth, radioactivity less than 2 x 10^{-12}g. Ra/g. rock: 929.

Greene County
Carbonaceous Shale, Uranium-bearing
A.B.C. Coal Co. mine 3 mi. W of Linton, SW¼NW¼ Sec. 20, T. 7 N., R. 7 W., Linton quadrangle: Coal V, 7.4 ft. thick, showed radioactivity of less than 0.001% eU in seven samples taken between 0-6.7 ft. above base and 0.002% eU at 6.7-7.4 ft. above base, latter sample having 11.1% ash and showing a uranium content of 0.022% U in ash and 0.002% U in sample; overlying black shale 3 ft. thick showed radioactivity of 0.001% eU in a 0.6 x 0.6 ft. pyrite nodule 1 ft. above base; 0.008% eU at 0-1 ft. above base, this sample also containing 0.008% U; 0.004% eU at 1-2 ft. above base; 0.003% eU at 2-3 ft. above base; overlying gray shale showed radioactivity

INDIANA (contd.)

Greene County (contd.)
Carbonaceous shale, Uranium-bearing
A.B.C. Coal Co. mine 3 mi. W of Linton, SW¼NW¼ Sec. 20, T. 7 N., R. 7 W., Linton quadrangle: of 0.002% eU; radioactivity in coal and black shale apparently due to the uranium which may have been deposited contemporaneously with the coal, may have accumulated in the plants that formed the coal, or may have been deposited in the coal after it was formed; the present study gave no conclusive evidence concerning the time of accumulation of uranium: 967.
Coal, Uranium-bearing
A.B.C. Coal Co. mine 3 mi. W of Linton, SW¼NW¼ Sec. 20, T. 7 N., R. 7 W., Linton quadrangle: Coal V, 7.4 ft. thick, showed radioactivity of less than 0.001% eU in seven samples taken between 0-6.7 ft. above base and 0.002% eU at 6.7-7.4 ft. above base, latter sample having 11.1% ash and showing a U content of 0.022% U in ash and 0.002% U in sample; overlying black shale 3 ft. thick showed radioactivity of 0.001% eU in a 0.6 x 0.6 ft. pyrite nodule 1 ft. above base; 0.008% eU at 0-1 ft. above base, this sample also containing 0.008% U; 0.004% eU at 1-2 ft. above base; 0.003% eU at 2-3 ft. above base; overlying gray shale showed radioactivity of 0.002% eU; radioactivity in coal and black shale apparently due to the uranium which may have been deposited contemporaneously with the coal, may have accumulated in the plants that formed the coal, or may have been deposited in the coal after it was formed; the present study gave no conclusive evidence concerning the time of accumulation of uranium: 967.

INDIANA (contd.)

Greene County (contd.)

Radioactive Coal

Al Lohr Coal Co. mine 1 mi. SW of Worthington, SW¼SW¼ Sec. 20, T. 8 N., R. 5 W., Bloomfield quadrangle: Upper Block coal showed radioactivity of less than 0.001% eU: 967.

Comet Collieries, Inc., mine 1.7 mi. E of Switz City, SW¼SE¼ Sec. 24, T. 7 N., R. 6 W., Switz City quadrangle: two layers of Upper Block coal, separated by 12 ft. of shale, both showed radioactivity of less than 0.001% eU: 967.

Lambright Coal Co. mine 3.5 mi. W of Bloomfield, SW¼SE¼ Sec. 19, T. 7 N., R. 5 W., Switz City quadrangle: Upper Block coal showed radioactivity of less than 0.001% eU: 967.

Maumee Collieries Co. mine 2.5 mi. SE of Jasonville, center of NW¼ Sec. 14, T. 8 N., R. 7 W., Jasonville quadrangle: Coal IV showed radioactivity of less than 0.001% eU: 967.

Maumee Collieries Co. mine 3.7 mi. SW of Linton, SE¼NW¼ Sec. 30, T. 7 N., R. 7 W., Linton quadrangle: Coal V showed radioactivity of less than 0.001% eU; overlying 1 ft. of gray shale showed radioactivity of 0.002% eU; overlying 4.4 ft. of black shale showed radioactivity of 0.007% eU at 0-1 and 1-2 ft. above base, 0.008% eU at 2-3 ft. above base, 0.004% eU at 3-4 ft. above base, and 0.003% eU at 4-4.4 ft. above base: 967.

No. V Coal: top foot of this coal in Greene and Warrick Counties showed 0.001% eU or greater; coal is now being mined and considerable reserves probably remain but radioactive part underlies only a small area: 996.

INDIANA (contd.)

Greene County (contd.)

Radioactive Coal

S. and A. Coal Corp. mine 2.5 mi. NE of Dugger, NW¼SW¼ Sec. 30, T. 8 N., R. 7 W., Linton quadrangle: Coal VI showed radioactivity of less than 0.001% eU: 967.

Smock Coal Co. mine 1.5 mi. SW of Switz City, SE¼NE¼ Sec. 28, T. 7 N., R. 6 W., Switz City quadrangle: Upper Block coal showed radioactivity of less than 0.001% eU: 967.

Radioactive Shale

Al Lohr Coal Co. mine 1 mi. SW of Worthington, SW¼SW¼ Sec. 20, T. 8 N., R. 5 W., Bloomfield quadrangle: Upper Block coal showed radioactivity of less than 0.001% eU: 967.

Maumee Collieries Co. mine 3.7 mi. SW of Linton, SE¼NW¼ Sec. 30, T. 7 N., R. 7 W., Linton quadrangle: Coal V showed radioactivity of less than 0.001% eU; overlying 1 ft. of gray shale showed radioactivity of 0.002% eU; overlying 4.4 ft. of black shale showed radioactivity of 0.007% eU at 0-1 and 1-2 ft. above base, 0.008% eU at 2-3 ft. above base, 0.004% eU at 3-4 ft. above base, and 0.003% eU at 4-4.4 ft. above base: 967.

Maumee Collieries Co. mine 2.5 mi. SE of Jasonville, center of SW¼ Sec. 14, T. 8 N., R. 7 W., Jasonville quadrangle: Coal IV showed radioactivity of less than 0.001% eU: 967.

S. and A. Coal Corp. mine 2.5 mi. NE of Dugger, NW¼SW¼ Sec. 30, T. 8 N., R. 7 W., Linton quadrangle: Coal VI showed radioactivity of less than 0.001% eU: 967.

INDIANA (contd.)

Greene County (contd.)
Uranium Occurrences
Carbonaceous Shale, Uranium-bearing
A.B.C. Coal Co. mine 3 mi. W of Linton, SW¼NW¼ Sec. 20, T. 7 N., R. 7 W., Linton quadrangle: Coal V, 7.4 ft. thick, showed radioactivity of less than 0.001% eU in seven samples taken between 0-6.7 ft. above base and 0.002% eU at 6.7-7.4 ft. above base, latter sample having 11.1% ash and showing 0.022% U in ash and 0.002% U in sample; overlying black shale 3 ft. thick showed radioactivity of 0.001% eU in a 0.6 x 0.6 ft. pyrite nodule 1 ft. above base; 0.008% eU at 0-1 ft. above base, this sample also containing 0.008% U; 0.004% eU at 1-2 ft. above base; 0.003% eU at 2-3 ft. above base; overlying gray shale showed radioactivity of 0.002% eU: 967.
Coal, Uranium-bearing
A.B.C. Coal Co. mine 3 mi. W of Linton, SW¼NW¼ Sec. 20, T. 7 N., R. 7 W., Linton quadrangle: Coal V, 7.4 ft. thick, showed radioactivity of less than 0.001% eU in seven samples taken between 0-6.7 ft. above base and 0.002% eU

at 6.7-7.4 ft. above base, latter sample having 11.1% ash and showing 0.022% U in ash and 0.002% U in sample; overlying black shale 3 ft. thick showed radioactivity of 0.001% eU in a 0.6 x 0.6 ft. pyrite nodule 1 ft. above base; 0.008% eU at 0-1 ft. above base, this sample also containing 0.008% U; 0.004% eU at 1-2 ft. above base; 0.003% eU at 2-3 ft. above base; overlying gray shale showed radioactivity of 0.002% eU: 967.

INDIANA (contd.)

Knox County
Radioactive Coal
Shasta Coal Corp. mine 2.6 mi. NW of Edwardsport, SW¼NE¼ Sec. 27, T. 5 N., R. 8 W., Bicknell quadrangle: Coal VI showed radioactivity of less than 0.001% eU: 967.

LaPorte County
Monazite Occurrences
Michigan City: monazite, 34 lbs. per ton: 11.
Thorium Occurrences
Michigan City: monazite, 34 lbs. per ton: 11.

Monazite Occurrences
See under individual county names and under Index III, Thorium Occurrences-Indiana: 11, 1105.

Monroe County
Radioactive Springs
Bloomington
General: radioactivity studies of the water from the Hottle, Illinois Central, and J.C.S. springs seem to show: a low value for May, an increase during September, and another decrease in October and December: 906; the increase appears to coincide roughly with a season of rain and the decrease with dry weather: 906; the decrease in may also result from a small flow, during which there is more splashing and trickling over rocks near the mouth of the spring and consequent loss of emanation: 906;

INDIANA (contd.)

Monroe County (contd.)
Radioactive Springs
Bloomington
General: variations in radioactivity of spring waters are caused by rainwater dissolving emanation and carrying it downward as it percolates through the soil; radioactivity measured by use of Schmidt shaking method and an emanation electroscope: 905; radioactivity is higher and more constant in Hottle spring than in Illinois Central spring but fluctuations in radioactivity, in general, are similar in both; flow of Hottle spring is more constant but not always higher than that of Illinois Central spring: 905.
Hottle spring: this spring issued from a crack in solid rock: 905, 906; radioactivity tested once a week for three months to study variations: 905, 906; temperature of water, 13°C. and radioactivity, 650 x 10^{-12} curies/liter: 903; results of studies made in 1914 giving date, temperature of water, and radioactivity (as value given x 10^{-12} curies/liter) were as follows: Sept. 24, 13°C., 650; Oct. 16, 13°C., 695; Oct. 23, 13.3°C., 700; Oct. 30, 13°C., 665; Nov. 6, 13°C., 650; Nov. 13, 13°C., 705; Nov. 20, 13°C., 520; Nov. 26, 13°C., 550; Dec. 3, 13°C., 535; Dec. 11, 13°C., 510; Dec. 18, 13°C., 450: 905, 906; and Dec. 26, 13°C., 445: 905; results of similar studies made in 1915 giving date, temperature of water, radioactivity (as value given, x 10^{-12} curies/liter), and, where given, flow (in gallons per day) were as follows: Jan. 1, no temperature given, 560, flow 20,000; Jan. 7, 12.6°C., 1020; Jan. 14, 13°C., 770; Jan. 21, 13°C., 680; Jan. 28, 12°C., 610;

INDIANA (contd.)

Monroe County (contd.)
Radioactive Springs
Bloomington
Hottle spring:
Feb. 4, 12°C., 850, flow 62,000; Feb. 11, 12°C., 875; Feb. 18, 11.8°C., 915; Feb. 25, 11.3°C., 890; March 5, 11.5°C., 1010; March 11, 11.5°C., 900; March 18, 11.3°C., 920; March 25, 11.3°C., 800; April 1, 11°C., 670; April 8, 11.3°C., 690; April 15, no temperature given, 830; April 22, 12°C., 890; April 28, no temperature given, 750; May 7, 11.4°C., 1140; May 13, 11.9°C., 825; May 21, 11°C., 1050; May 27, 12°C., 1340; June 3, 11.6°C., 1420; June 10, 11.8°C., 1120; June 25, 12°C., 1280: 905; radioactivity remained almost constant: 906; flow of this spring was about 15,000 gallons per day: 906.
Illinois Central spring: this spring issued from the ground at the root of a beech tree through coarse gravel or stones: 905, 906; radioactivity tested once a week for three months to study variations: 905, 906; results of studies made in 1914 giving date, temperature of water, and radioactivity (as value given x 10^{-12} curies/liter) were as follows: March 4, 12°C., 600; May 23, 12.2°C., 265; July 24, no temperature given, 330; Sept. 24, 13°C., 445; Oct. 16, 12.8°C., 166; Oct. 23, 13°C., 120; Oct. 30, 12.7°C., 20; Nov. 6, 12.6°C., 40; Nov. 13, 12.6°C., 20; Nov. 20, 13°C., 20; Nov. 26, 13°C., 33; Dec. 3, 13°C., 60; Dec. 11, 13°C., 20; Dec. 18, 13°C., no radioactivity recorded: 906;

INDIANA (contd.)

Monroe County (contd.)
Radioactive Springs
Bloomington
Illinois Central Spring: temperature of water, 12.5°C. and radioactivity, 600 x 10^{-12} curies/liter; temperature of water, 12.2°C. and radioactivity, 265 x 10^{-12} curies/liter: 903; results of studies made in 1914 giving date, temperature of water, and radioactivity (as value given, x 10^{-12} curies/liter) were as follows: Oct. 30, 12.7°C., 20; Nov. 6, 12.6°C., 40; Nov. 13, 12.6°C., 20; Nov. 20, 13°C., 20; Nov. 26, 13°C., 33; Dec. 3, 13°C., 60; Dec. 11, 13°C., 20; Dec. 18, 13°C., no radioactivity recorded; and Dec. 26, 12.8°C., no radioactivity recorded, flow 5000 gallons per day: 905; results of similar studies made in 1915 giving date, temperature of water, radioactivity (as value given, x 10^{-12} curies/liter) and flow (in gallons per day) were as follows: Jan. 1, no temperature given, 40, flow 32,000; Jan. 7, 12°C., 340, flow, 136, 000; Jan. 14, 13°C., 270, flow 39,500; Jan. 21, 12.8°C., 100, flow 40,000; Jan. 28, 12°C., 20, flow 32,000; Feb. 4, 12°C., 750, flow 250,000; Feb. 11, 12.6°C., 166, flow 123,000; Feb. 18, 12°C., 350, flow 100, 000; Feb. 25, 12°C., 170, flow 85,000; March 5, 12°C., 143, flow 100,000; March 11, 12°C., 220, flow 85,000; March 18, 12°C., 160, flow 62,500; March 25, 12°C., 90, flow 40,000; April 1, 12°C., 45, flow 30,000; April 8, 12°C., 30, flow 30,000; April 15, 12°C., 60, flow 28,000; April 22, 12°C., 60, flow 30,000; April 28, 12.2°C., 410, flow 25,000; May 7, 12°C., 365, flow 410,000; May 13, 12.4°C., 365,

INDIANA (Contd.)

Monroe County (contd.)
Radioactive Springs
Bloomington
Illinois Central spring: flow 60,000; May 21, 12.3°C., 25, flow 42,000; May 27, 12°C., 750, flow 500,000; June 3, 12°C., 820, flow 400,000; June 10, 12°C., 355, flow 76,000; June 25, 12.5°C., 715, flow 30,000: 905; radioactivity fell from 600 x 10^{-12} curies/liter to almost zero: 906; flow of this spring was about 15,000 gallons per day but lowered perceptibly during October and November: 906.

J.C.S. spring, 2 mi. SE of Bloomington: (See p. 269)

J.C.S. Old spring, 2 mi. SE of Bloomington: temperature of water, 11.5°C. and radioactivity, 660 x 10^{-12} curies/liter: 903.

Stone spring, 2 miles SW of Bloomington: temperature of water, 11°C. and radioactivity, 77 x 10^{-12} curies/liter: 903.

Weimer spring, 3 mi. SW of Bloomington: temperature of water, 12.3°C. and radioactivity, 175 x 10^{-12} curies/liter: 903.

INDIANA (contd.)

Monroe County (contd.)

Radioactive Springs
Bloomington
J.C.S. spring, 2 mi. SE of Bloomington: three special radioactivity determinations made on water from this spring on Aug. 5, 1914, at a water temperature of 12.5°C. and an air temperature of 30°C. gave the following results: started at 11:03 a.m., volume of water 0.707 liter, volume of air 0.943 liter, and radioactivity 425 x 10^{-12} curies/liter; started at 11:46 a.m., volume of water, 3.00 liters, volume of air, 4.10 liters, and radioactivity 435 x 10^{-12} curies/liter; started at 2 p.m., volume of water, 5.00 liters, volume of air, 2.10 liters, and radioactivity 443 x 10^{-12} curies/liter: 903; "these observations were taken every minute and the mean deflection from 15 to 20 minutes from the time of putting the emanation in the ionization chamber, was used... a better agreement could have been obtained if the interval from the end of one experiment to the beginning of the next had been three hours or more": 903; temperature of water, 10.3°C. and radioactivity, 430 x 10^{-12} curies/liter; temperature of water, 11.5°C. and radioactivity, 170 x 10^{-12} curies/liter: 903; results of studies made during 1914 giving date, temperature of water, and radioactivity (as value given, x 10^{-12} curies/liter) were as follows: March 13, 10.3°C., 430; May 16, 11.5°C., 170; August 5, 12.5°C., 425; Oct. 9, 15°C., 530: 906.

INDIANA (contd.)

Monroe County (contd.)
Radioactive Water
Bloomington: city water, temperature, 5°C. and radioactivity, 27 x 10^{-12} curies/liter; temperature, hot, and radioactivity, 41 x 10^{-12} curies/liter: 903.
Indiana University: city water, temperature, 5°C. and radioactivity, 45 x 10^{-12} curies/liter: 903.

Orange County
Radioactive Springs
French Lick
Bowles spring: radioactivity of water, 4.45 mache units per liter: 730.
Pluto spring: radioactivity of water, 1.35 mache units per liter: 730.
Proserpine spring: radioactivity of water, 1.96 mache units per liter: 730.

Origin of Carbonaceous Shale, Uranium-bearing
See under individual county names and under Index III, Origin-Carbonaceous Shale, Uranium-bearing-Indiana: 967.

Origin of Coal, Uranium-bearing
See under individual county names and under Index III, Origin-Coal, Uranium-bearing-Indiana: 967.

Origin of Radioactive Coal
See under individual county names and under Index III, Origin-Radioactive Coal-Indiana: 967.

Origin of Radioactive Shale
See under individual county names and under Index III, Origin-Radioactive Shale-Indiana: 967.

INDIANA (contd.)

Owen County
Radioactive Coal
Maumee Collieries Co. mine 1.5 mi. SE of Coal City, SE¼SW¼ Sec. 13, T. 9 N., R. 6 W., Coal City quadrangle: Upper Block coal showed radioactivity of less than 0.001% eU: 967.

Parke County
Radioactive Coal
Maple Grove Coal Co. 7 mi. SE of Rockville, SE¼NE¼ Sec. 2, T. 14 N., R. 7 W.: Coal II showed radioactivity of less than 0.001% eU: 967.
Turner Coal & Clay Co. mine 1.3 mi. N of Carbon, NE¼NW¼ Sec. 32, T. 14 N., R. 6 W.: Upper Block coal showed radioactivity of less than 0.001% eU: 967.

Pike County
Carbonaceous Shale, Uranium-bearing
Ayrshire Collieries Corp. mine 2 mi. NE of Winslow, SE¼SE¼ Sec. 21, T. 1 S., R. 7 W., Velpen quadrangle: Coal V showed radioactivity of less than 0.001% eU but overlying black shale showed radioactivity of 0.016% eU and sample also contained 0.021% U; overlying gray shale showed radioactivity of 0.003% eU at 0-1 ft. above base and 0.004% eU at 1-2 ft. above base; Coal Va, 16.9 ft. above gray shale, showed radioactivity of less than 0.001% eU; radioactivity in coal and black shale apparently due to the uranium which may have been deposited contemporaneously with the coal, may have accumulated in the plants that formed the coal, or may have been deposited in the coal after it was formed; the present study gave no conclusive evidence concerning the time of accumulation of uranium: 967.

INDIANA (contd.)

Pike County (contd.)
Radioactive Coal
Ayrshire Collieries Corp. mine 1 mi. N of Arthur, SW¼SE¼ Sec. 12, T. 2 S., R. 8 W., Velpen quadrangle: Coal V showed radioactivity of less than 0.001% eU; overlying gray shale showed radioactivity of 0.003% eU; overlying black shale showed radioactivity of 0.010% eU at 0-1 ft. above base and 0.005% eU at 1-1.7 ft. above base; Coal Va, 6 ft. above black shale, showed radioactivity of less than 0.001% eU: 967.
Ayrshire Collieries Corp. mine 2 mi. NE of Winslow, SE¼SE¼ Sec. 21, T. 1 S., R. 7 W., Velpen quadrangle: Coal V showed radioactivity of less than 0.001% eU; overlying black shale showed radioactivity of 0.016% eU but sample contained 0.021% U; overlying gray shale showed radioactivity of 0.003% eU at 0-1 ft. above base and 0.004% eU at 1-2 ft. above base; Coal Va, 16.9 ft. above gray shale, showed radioactivity of less than 0.001% eU: 967.
Blackfoot Land and Coal Corp. mine 7 mi. SE of Arthur, center of SW¼ Sec. 15, T. 3 S., R. 7 W., Degonia Springs quadrangle: Coal IV showed radioactivity of less than 0.001% eU: 967.
Enos Coal Mining Co. mine 3.8 mi. SW of Arthur, SW¼SW¼ Sec. 35, T. 2 S., R. 8 W., Petersburg quadrangle: Coal V showed radioactivity of less than 0.001% eU; overlying 2 ft. of gray shale, 2 ft. above Coal V, showed radioactivity of 0.003% eU at 0-1 ft. above base and 0.004% eU at 1-2 ft. above base; overlying 1.7 ft. of black shale showed radioactivity of 0.008% eU at 0-1 ft. above base and 0.003% eU at 1-1.7 ft. above

INDIANA (contd.)

Pike County (contd.)

Radioactive Coal

Enos Coal Mining Co. mine 3.8 mi. SW of Arthur, SW¼SW¼ Sec. 35, T. 2 S., R. 8 W., Petersburg quadrangle: base: 967.

Enos Coal Mining Co. mine 2.5 mi. E of Spurgeon, SE¼SW¼ Sec. 17, T. 3 S., R. 7 W., Degonia Springs quadrangle: Coal V showed radioactivity of less than 0.001% eU; overlying shale showed radioactivity of 0.009% eU at 0-1 ft. above base and 0.004% eU at 1-1.5 ft. above base: 967.

Radioactive Shale

General: radioactive grayish-black shale with brachiopods and other marine fossils forms roof of No. V coal and averages 0.009% eU, its radioactivity ranging from 0.006 to 0.016% eU, in nine samples from widespread localities in Pike, Vermillion, Vigo, and Warrick Counties; shale is 4-6 ft. in thickness at most localities and exposed in many strip mines: 996.

Ayrshire Collieries Corp. mine 1 mi. N of Arthur, SW¼SE¼ Sec. 12, T. 2 S., R. 8 W., Velpen quadrangle: Coal V showed radioactivity of less than 0.001% eU; overlying gray shale showed radioactivity of 0.003% eU; overlying black shale showed radioactivity of 0.010% eU at 0-1 ft. above base and 0.005% eU at 1-1.7 ft. above base; Coal Va, 6 ft. above black shale, showed radioactivity of less than 0.001% eU: 967.

INDIANA (contd.)

Pike County (contd.)

Radioactive Shale

Ayrshire Collieries Corp. mine 2 mi. NE of Winslow, SE¼SE¼ Sec. 21, T. 1 S., R. 7 W.; Velpen quadrangle: Coal V showed radioactivity of less than 0.001% eU, overlying black shale showed radioactivity of 0.016% eU but sample contained 0.021% U; overlying gray shale showed radioactivity of 0.003% eU at 0-1 ft. above base and 0.004% eU at 1-2 ft. above base; Coal Va, 16.9 ft. above gray shale, showed radioactivity of less than 0.001% eU: 967.

Blackfoot Land and Coal Corp. mine 7 mi. SE of Arthur, center of SW¼ Sec. 15, T. 3 S., R. 7 W., Degonia Springs quadrangle: Coal IV showed radioactivity of less than 0.001% eU: 967.

Enos Coal Mining Co. mine 3.8 mi. SW of Arthur, SW¼SW¼ Sec. 35, T. 2 S., R. 8 W., Petersburg quadrangle: Coal V showed radioactivity of less than 0.001% eU; overlying 2 ft. of gray shale, 2 ft. above Coal V, showed radioactivity of 0.003% eU at 0-1 ft. above base and 0.004% eU at 1-2 ft. above base; overlying 1.7 ft. of black shale showed radioactivity of 0.008% eU at 0-1 ft. above base and 0.003% eU at 1-1.7 ft. above base: 967.

Enos Coal Mining Co. mine 2.5 mi. E of Spurgeon, SE¼SW¼ Sec. 17, T. 3 S., R. 7 W., Degonia Springs quadrangle: Coal V showed radioactivity of less than 0.001% eU; overlying shale showed radioactivity of 0.009% eU at 0-1 ft. above base and 0.004% eU at 1-1.5 ft. above base: 967.

INDIANA (contd.)

Posey County
Radioactive Rocks
Well in Sec. 7, T. 6 S., R. 12 W: calcareous shale from unknown depth, radioactivity 16.3 ± - 1.8 x 10^{-12}g. Ra/g. rock: 929; relationship of radioactivity of sample to organic content and sedimentation studied: 928.
Well in Sec. 23, T. 6 S., R. 13 W: Cypress sandstone sample from 2449 ft. depth, radioactivity 7.0 ± - 1.3 x 10^{-12}g. Ra/g. rock: 929; relationship of radioactivity of sample to organic content and sedimentation studied: 928.
Radioactivity Determinations
Well in Sec. 7, T. 6 S., R 12 W: calcareous shale from unknown depth, radioactivity 16.3 ± - 1.8 x 10^{-12}g. Ra/g. rock: 929.
Well in Sec. 23-T 6 S., R 13 W: Cypress sandstone sample from 2449 ft. depth, radioactivity 7.0 ± - 1.3 x 10^{-12}g. Ra/g. rock: 929.
Radioactivity Determinations
Radioactive Rocks
Well in Sec. 7, T. 6 S., R. 12 W: calcareous shale from unknown depth, radioactivity 16.3 ± - 1.8 x 10^{-12}g. Ra/g. rock: 929.
Well in Sec. 23 T. 6 S., R 13 W: Cypress sandstone sample from 2449 ft. depth, radioactivity 7.0 ± - 1.3 x 10^{-12}g. Ra/g. rock: 929.

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Radioactive Carbonaceous Shale
See under individual county names and under Index III, Radioactive Carbonaceous Shale-Indiana: 967.

Radioactive Coal
See under individual county names and under Index III, Radioactive Coal-Indiana: 967

*Prospectors' Guides
See under individual county names and under Index III, Prospectors' Guides-Indiana: 1101.

INDIANA (contd.)

Radioactive Rocks
See under individual county names and under Index III, Radioactive Rocks-Indiana: 928, 929.

Radioactive Shale
See under individual county names and under Index III, Radioactive Shale-Indiana: 967, 996.

Radioactive Springs
See under individual county names and under Index III, Radioactive Springs-Indiana: 730, 903, 904, 905, 906.

Radioactive Water
See under individual county names and under Index III, Radioactive Water-Indiana: 903.

Radioactivity Determinations
See under individual county names and under Index III, Radioactivity Determinations-Indiana: 903, 905, 906, 929.

Randolph County
Radioactive Water
Union City: city water, temperature, 19° C. and radioactivity, 45 x 10^{-12} curies/liter: 903.
Forest Park, 6 mi. E of Union City: well, temperature of water, 12° C. and radioactivity, 185 x 10^{-12} curies/liter: 903.

Southwest Part
Radioactive Carbonaceous Shale
Black carbonaceous shale above Coal V and the Minshall coals: radioactivity of 0.006 and 0.003% eU respectively, apparently increasing with increase of organic matter in shale; shale above Coal V is widespread in Indiana and adjacent states and reserves are large: 967.

INDIANA (contd.)

Southwest Part (contd.)
Radioactive Coal
Upper Block, Minshall, Gentryville, Coal V, and VII, all Pennsylvanian coal beds: showed radioactivity of 0.001% eU; occur only locally and reserves are small: 967.

Spencer County
Coal, Uranium-bearing
Gentryville, Uncorrelated coal near: showed radioactivity of 0.001% eU or greater; no appreciable reserves present: 996.
Minshall coal: showed radioactivity of 0.001% eU or greater; no appreciable reserves present: 996.
Road cut 1.8 mi. S of Gentryville, SW¼SW¼ Sec. 12, T. 5 S., R. 6 W., Degonia Springs quadrangle: Gentryville coal showed radioactivity of 0.001-0.002% eU but contained 20.4% ash with a uranium content of 0.0058% U in ash and 0.0012% U in sample; radioactivity apparently due to the uranium which may have been deposited contemporaneously with the coal, may have accumulated in the plants that formed the coal, or may have been deposited in the coal after it was formed; the present study gave no conclusive evidence concerning the time of accumulation of uranium: 967; uranium in Gentryville coal could have been deposited by groundwater moving down through the sandstone above the coal while the source of the uranium could have been beds above the sandstone or the sandstone itself: 967.
Radioactive Coal
Gentryville, unidentified coal near: reported in 1949 as showing radioactivity of 0.003% eU and is called Gentryville coal here: 967.

INDIANA (contd.)

Spencer County (contd.)
Radioactive Coal
Loran Day's mine 2 mi. N of Newtonville, SW¼SE¼ Sec. 34, T. 5 S., R. 5 W., St. Meinrad quadrangle: Minshall coal, 2.6 ft. thick, showed radioactivity of less than 0.001% eU at 0-1 and 1-2 ft. above base and 0.002% eU at 2-2.6 ft. above base; overlying 3 ft. of shale showed radioactivity of 0.002% eU at 0-1, 1-2, and 2-3 ft. above base: 967.
Mulzer Mines, abandoned mine 3.7 mi. SE of Gentryville, SW¼NE¼ Sec. 16, T. 5 S., R. 5 W., St. Meinrad quadrangle: Minshall coal showed radioactivity of 0.001% eU and overlying shale showed radioactivity of 0.003% eU at 0-1 and 1-1.7 ft. above base: 967.
Mulzer Mines mine 4.3 mi. NE of Chrisney, SE¼NE¼ Sec. 33, T. 5 S., R. 5 W., St. Meinrad quadrangle: Minshall coal showed radioactivity of less than 0.001% eU; overlying 5 ft. of shale showed radioactivity of 0.001% eU at 0-1 ft. above base, and 0.002% eU at 1-2, 2-3, 3-4, and 4-5 ft. above base: 967.
Road cut 1.8 mi. S of Gentryville, SW¼SW¼ Sec. 12, T. 5 S., R. 6 W., Degonia Springs quadrangle: Gentryville coal showed radioactivity of 0.001-0.002% eU but contained 20.4% ash with a uranium content of 0.0058% U in ash and 0.0012% U in sample: 967.
Radioactive Shale
Loran Day's mine 2 mi. N of Newtonville, SW¼SE¼ Sec. 34, T. 5 S., R. 5 W., St. Meinrad quadrangle: Minshall coal, 2.6 ft. thick, showed radioactivity of less than 0.001% eU at 0-1 and 1-2 ft. above base

INDIANA (contd.)

Spencer County (contd.)

Radioactive Shale

Loran Day's mine 2 mi. N of Newtonville, SW¼SE¼ Sec. 34, T. 5 S., R. 5 W., St. Meinrad quadrangle: and 0.002% eU at 2-2.6 ft. above base; overlying 3 ft. of shale showed radioactivity of 0.002% eU at 0-1, 1-2, and 2-3 ft. above base: 967.

Mulzer Mines, abandoned mine 3.7 mi. SE of Gentryville, SW¼NE¼ Sec. 16, T. 5 S., R. 5 W., St. Meinrad quadrangle: Minshall coal showed radioactivity of 0.001% eU and overlying shale showed radioactivity of 0.003% eU at 0-1 and 1-1.7 ft. above base: 967.

Mulzer Mines mine 4.3 mi. NE of Chrisney, SE¼NE¼ Sec. 33, T.5 S., R. 5 W., St. Meinrad quadrangle: Minshall coal showed radioactivity of less than 0.001% eU; overlying 5 ft. of shale showed radioactivity of 0.001% eU at 0-1 ft. above base, and 0.002% eU at 1-2, 2-3, 3-4, and 4-5 ft. above base: 967.

Uranium Occurrences

Coals, Uranium-bearing

Road cut 1.8 mi. S of Gentryville, SW¼SW¼ Sec. 12, T. 5 S., R. 6 W., Degonia Springs quadrangle: Gentryville coal showed radioactivity of 0.001-0.002% eU but contained 20.4% ash with a uranium content of 0.0058% U in ash and 0.0012% U in sample; radioactivity apparently due to the uranium which may have been accumulated in the plants that formed the coal, or may, have been deposited in the coal after it was formed but present study gave no conclusive evidence concerning the time of accumulation of uranium: 967; uranium in

INDIANA (contd.)

Spencer County (contd.)

Uranium Occurrences

Coal, Uranium-bearing

Road cut 1.8 mi. S of Gentryville, SW¼SW¼ Sec. 12, T. 5 S., R. 6 W., Degonia Springs quadrangle: Gentryville coal could have been deposited by groundwater moving down through the sandstone above the coal while the source of the uranium could have been beds above the sandstone or the sandstone itself: 967.

Sullivan County

Radioactive Coal

Maumee Collieries Co. mine 1 mi. SW of Dugger, SE¼NW¼ Sec. 11, T. 7 N., R. 8 W., Dugger quadrangle: Coal VII showed radioactivity of less than 0.001% eU: 967.

Sherwood-Templeton Coal Co. mine 3.5 mi. S of Hymera, NE¼SE¼ Sec. 16, T. 8 N., R. 8 W., Hymera quadrangle: Coal VI showed radioactivity of less than 0.001% eU: 967.

Tri-State Mining Corp. mine 1 mi. NE of Dugger, NW¼NE¼ Sec. 1, T. 7 N., R. 8 W., Linton quadrangle: Coal VI showed radioactivity of less than 0.001% eU: 967.

Thorium Occurrences

See under individual county names and under Index III, Thorium Occurrences-Indiana: 11, 1105.

Uranium Exploration

See under individual county names and under Index III, Uranium Exploration-Indiana: 1101.

Uranium Occurrences

See under individual county names and under Index III, Uranium Occurrences-Indiana: 426, 443, 642, 841, 883, 996, 1106.

INDIANA (contd.)

Vermillion County

Radioactive Coal

Ayrshire Collieries Corp. mine 5 mi. W of Clinton, SE¼NW¼ Sec. 23, T. 14 N., R. 10 W.: Coal VII showed radioactivity of less than 0.001% eU in six samples, 5 taken between 0-5 ft. above base and 1 at 6-6.6 ft. above base, and of 0.001% eU at 5-6 ft. above base: 967.

Harris Coal Co. mine 5.5 mi. W of Newport, SW¼NE¼ Sec. 35, T. 17 N., R. 10 W.: Coal III showed radioactivity of less than 0.001% eU: 967.

Kanizer Brothers Coal Co. mine 3 mi. NE of Clinton, NW¼SW¼ Sec. 33, T. 15 N., R. 9 W.: Coal V showed radioactivity of less than 0.001% eU; overlying shale showed radioactivity of 0.007% eU at 0-1 ft. above base: 967.

Radioactive Shale

General: radioactive grayish-black shale with brachiopods and other marine fossils forms roof of No. V coal and averages 0.009% eU, its radioactivity ranging from 0.006 to 0.016% eU, in nine samples from widespread localities in Pike, Vermillion, Vigo, and Warrick Counties; shale is 4-6 ft. in thickness at most localities and exposed in many strip mines: 996.

Kanizer Brothers Coal Co. mine 3 mi. NE of Clinton, NW¼SW¼ Sec. 33, T. 15 N., R. 9 W.: Coal V showed radioactivity of less than 0.001% eU; overlying shale showed radioactivity of 0.007% eU at 0-1 ft. above base: 967.

Reeder and Hill Coal Co. abandoned mine 2 mi. S of Clinton, SE¼NW¼ Sec. 27, T. 14 N., R. 9 W.: shale from dump (probably shale above Coal V) showed radioactivity of 0.006% eU: 967.

INDIANA (contd.)

Vigo County

Radioactive Coal

Girton Coal Co. mine 2.5 mi. N of Seelyville, SE¼NE¼ Sec. 35, T. 13 N., R. 8 W.: Coal III showed radioactivity of less than 0.001% eU: 967.

Maumee Collieries Co. mine 9 mi. SE of Terre Haute, SE¼SW¼ Sec. 32, T. 11 N., R. 8 W., Lewis quadrangle: sample of shale from waste pile showed radioactivity of 0.010% eU; Coal V showed radioactivity of less than 0.001% eU; overlying shale showed radioactivity of 0.010% eU at 0-1 ft. above base and 0.005% eU at 1-1.6 ft. above base: 967.

Radioactive Shale

General: radioactive grayish-black shale with brachiopods and other marine fossils forms roof of No. V coal and averages 0.009%eU, its radioactivity ranging from 0.006 to 0.016% eU, in nine samples from widespread localities in Pike, Vermillion, Vigo, and Warrick Counties; shale is 4-6 ft. in thickness at most localities and exposed in many strip mines: 996.

Maumee Collieries Co. mine 9 mi. SE of Terre Haute, SE¼SW¼ Sec. 32, T. 11 N., R. 8 W., Lewis quadrangle: sample of shale from waste pile showed radioactivity of 0.010% eU; Coal V showed radioactivity of less than 0.001% eU; overlying shale showed radioactivity of 0.010% eU at 0-1 ft. above base and 0.005% eU at 1-1.6 ft. above base: 967.

INDIANA (contd.)

Warrick County

Coal, Uranium-bearing

Tecumseh Coal Corp. mine 6 mi. SE of Lynnville, SW¼SW¼ Sec. 29, T. 4 S., R. 7 W., Degonia Springs quadrangle: Coal V, 7.3 ft. thick, showed radioactivity of less than 0.001% eU in six samples taken between 0-6.8 ft. above base and of 0.002% eU sample taken at 6.8-7.3 ft. above base, the latter sample having 16.1% ash and showing a uranium content of 0.016% U in ash and 0.002% U in sample; overlying black carbonaceous shale 2 ft. thick showed radioactivity of 0.008% eU at 0-1 ft. above base and 0.007% eU at 1-2 ft. above base; radioactivity apparently due to the uranium which may have been deposited contemporaneously with the coal, may have accumulated in the plants that formed the coal, or may have been deposited in the coal after it was formed; the present study gave no conclusive evidence concerning the time of acculation of uranium: 967.

Radioactive Coal

Blackfoot Land and Coal Corp. mine 1.8 mi. N of Scalesville, center of NW¼ Sec. 28, T. 3 S., R. 7 W., Degonia Springs quadrangle: Coal V showed radioactivity of less than 0.001% eU; overlying black shale, 1 ft. thick, showed radioactivity of 0.006% eU and overlying gray shale showed radioactivity of 0.004% eU: 967.

No. V Coal: top foot of this coal in Greene and Warrick Counties showed 0.001% eU or greater; coal is now being mined and considerable reserves probably remain but radioactive part underlies only a small area: 996.

Sterchen and Heim's mine 1.6 mi. E of Yankeetown, SW¼SW¼ Sec. 11, T. 7 S., R. 8 W., Newburg quadrangle: Coal VII showed radioactivity of less than 0.001% eU: 967.

INDIANA (contd.)

Warrick County (contd.)

Radioactive Coal

Sunlight Coal Co. mine 2.6 mi. NW of Boonville, SW¼NW¼ Sec. 15, T. 5 S., R. 8 W., Boonville quadrangle: Coal V showed radioactivity of less than 0.001% eU but black carbonaceous shale 3.5 ft. thick lying above its 0.6 ft. overlying shale cover, which showed 0.003% eU radioactivity, showed radioactivities of 0.010% eU at 0.1 ft. above base, 0.008% eU at 1-2 ft. above base, 0.004% eU at 2-3 ft. above base, and 0.005% eU at 3-3.5 ft. above base: 967.

Tecumseh Coal Corp. mine 2.5 mi. SE of Scalesville, NE¼SW¼ Sec. 15, T. 4 S., R. 7 W., Degonia Springs quadrangle: Coal V, 6.4 ft. thick, showed radioactivity of less than 0.001% eU in four samples taken between 0-5.7 ft. above base and 0.002% eU at 5.7-6.4 ft. above base; overlying shale, 1.5 ft. thick showed radioactivity of 0.008% eU at 0-1 ft. above base and 0.004% eU at 1.5 ft. above base: 967.

Tecumseh Coal Corp. mine 6 mi. SE of Lynnville, SW¼SW¼ Sec. 29, T. 4 S., R. 7 W., Degonia Springs quadrangle: Coal V, 7.3 ft. thick, showed radioactivity of less than 0.001% eU in six samples taken between 0-6.8 ft. above base and of 0.002% eU in sample taken at 6.8-7.3 ft. above base, latter sample having 16.1% ash showing uranium content of 0.016% U in ash and 0.002% U in sample; overlying black carbonaceous shale, 2 ft. thick, showed radioactivity of 0.008% eU at 0-1 ft. above base and 0.007% eU at 1-2 ft. above base; Coal Va, lying 15.7 ft. above shale, showed radioactivity of 0.001% eU: 967.

INDIANA (contd.)

Warrick County (contd.)

Radioactive Shale

General: radioactive grayish-black shale with brachiopods and other marine fossils forms the roof of the No. V coal and averages 0.009% eU, its radioactivity ranging from 0.006-0.016% eU, in nine samples from widespread localities in Pike, Vermillion, Vigo, and Warrick Counties; shale is 4-6 ft. in thickness at most localities and exposed in many strip mines: 996.

Blackfoot Land and Coal Corp. mine 1.8 mi. N of Scalesville, center of NW¼ Sec. 28, T. 3 S., R. 7 W., Degonia Springs quadrangle: Coal V showed radioactivity of less than 0.001% eU; overlying black shale, 1 ft. thick, showed radioactivity of 0.006% eU and overlying gray shale showed radioactivity of 0.004% eU: 967.

Sunlight Coal Co. mine 2.6 mi. NW of Boonville, SW¼,NW¼ Sec. 15, T. 5 S., R. 8 W., Boonville quadrangle: Coal V showed radioactivity of less than 0.001% eU but its overlying 0.6 ft. shale cover gave 0.003% eU and black carbonaceous shale, 3.5 ft. thick, overlying this cover showed radioactivities of 0.010% eU at 0-1 ft. above base, 0.008% eU at 1-2 ft. above base, 0.004% eU at 2-3 ft. above base, and 0.005% eU at 3-3.5 ft. above base: 967.

Tecumseh Coal Corp. mine, 2.5 mi. SE of Scalesville, NE¼,SW¼ Sec. 15, T. 4 S., R. 7 W., Degonia Springs quadrangle: Coal V, 6.4 ft. thick, showed radioactivity of less than 0.001% eU in four samples taken between 0-5.7 ft. above base and 0.002% eU at 5.7-6.4 ft. above base; overlying shale, 1.5 ft. thick, showed radioactivity of 0.008% eU at 0-1 ft. above base and 0.004% eU at 1.5 ft. above base: 967.

INDIANA (contd.)

Warrick County (contd.)

Radioactive Shale

Tecumseh Coal Corp. mine, 6 mi. SE of Lynnville, SW¼,SW¼ Sec. 29, T. 4 S., R. 7 W., Degonia Springs quadrangle: Coal V, 7.3 ft. thick, showed radioactivity of less than 0.001% eU in six samples taken between 0-6.8 ft. above base and of 0.002% eU in sample taken at 6.8-7.3 ft. above base, latter sample having 16.1% ash and showing a uranium content of 0.016% U in ash and 0.002% U in sample; overlying black carbonaceous shale, 2 ft. thick, showed radioactivity of 0.008% eU at 0-1 ft. above base and 0.007% eU at 1-2 ft. above base; Coal Va, lying 15.7 ft. above shale, showed radioactivity of 0.001% eU: 967.

Uranium Occurrences

Tecumseh Coal Corp. mine, 6 mi. SE of Lynnville, SW¼,SW¼ Sec. 29, T. 4 S., R. 7 W., Degonia Springs quadrangle: Coal V, 7.3 ft. thick, showed radioactivity of less than 0.001% eU in six samples taken between 0-6.8 ft. above base and of 0.002% eU in sample taken at 6.8-7.3 ft. above base, latter sample having 16.1% ash and showing a uranium content of 0.016% U in ash and 0.002% U in sample; overlying black carbonaceous shale, 2 ft. thick, showed radioactivity of 0.008% eU at 0-1 ft. above base and 0.007% eU at 1-2 ft. above base; radioactivity apparently is due to uranium which may have been deposited contemporaneously with the coal, may have accumulated in the plants that formed the coal, or may have been deposited

INDIANA (contd.)

Warrick County (contd.)
Uranium Occurrences
Tecumseh Coal Corp. mine, 6 mi. SE of Lynnville, SW¼,SW¼ Sec. 29, T. 4 S., R. 7 W., Degonia Springs quadrangle: in the coal after it was formed; the present study gave no conclusive evidence concerning the time of accumulation of uranium: 967.
Coal, Uranium-bearing
Tecumseh Coal Corp. mine, 6 mi. SE of Lynnville, SW¼SW¼ Sec. 29, T. 4 S., R. 7 W., Degonia Springs quadrangle: Coal V, 7.3 ft. thick, showed radioactivity of less than 0.001% eU in six samples taken between 0-6.8 ft. above base and of 0.002% eU in sample taken at 6.8-7.3 ft. above base, latter sample having 16.1% ash and showing a uranium content of 0.016% U in ash and 0.002% U in sample; overlying black carbonaceous shale, 2 ft. thick, showed radioactivity of 0.008% eU at 0-1 ft. above base and 0.007% eU at 1-2 ft. above base; radioactivity apparently is due to the uranium which may have been deposited contemporaneously with the coal, may have accumulated in the plants that formed the coal, or may have been deposited in the coal after it was formed; the present study gave no conclusive evidence concerning the time of accumulation of uranium: 967.

MAINE

General
Bibliographies
Thorium Occurrences: 989.
Uranium Occurrences: 989.
Bibliography of U.S.G.S. reports: 572, 1004.
Black Shale, Uranium-bearing
General: black shales not abnormally radioactive, indicating that not all marine bituminous rocks or carbonaceous rocks are appreciably uraniferous: 405.
Geophysical Exploration (Ground)
General: study of radioactivity of rock outcrops along approximately 4600 miles of road by traverse with car-mounted Geiger-Mueller equipment and laboratory tests of samples indicated that the most radioactive outcrops sampled in the state contained a maximum of 0.008% eU, 0.003% U, and 0.004% thoria; there may be about 1300 such outcrops and the most radioactive one has a probable content of only 0.055% eU, according to a statistical study; no high-grade deposits were found: 877.
Monazite Occurrences
General: monazite in granites and gneisses: 104.
Prospectors' Guides
Exploration methods: 1101.
Mining laws: 1101.
Uranium: 1101.
Pyrochlore Occurrences
General: pyrochlore: 883.
Radioactive Rocks
General: study of radioactivity of rock outcrops along approximately 4600 miles of road by traverse with car-mounted Geiger-Mueller equipment and laboratory tests of samples indicated that the most radioactive outcrops sampled in the

MAINE (contd.)

General (contd.)
Radioactive Rocks
General:
state contained a maximum of 0.008% eU, 0.003% U, and 0.004% thoria; there may be about 1300 such outcrops and the most radioactive one has a probable content of only 0.055% eU, according to a statistical study; no high-grade deposits were found: 877.
Thorium Occurrences
General: monazite in granites and gneisses: 104; pyrochlore: 883; study of radioactivity of rock outcrops along approximately 4600 miles of road by traverse with car-mounted Geiger-Mueller equipment and laboratory tests of samples indicated that the most radioactive outcrops sampled in the state contained a maximum of 0.008% eU, 0.003% U, and 0.004% thoria; there may be about 1300 such outcrops and the most radioactive one has a probable content of only 0.055% eU, according to a statistical study; no high-grade deposits were found: 877.
Bibliography: 989.
Uranium Exploration
Geophysical Exploration (Ground)
General: study of radioactivity of rock outcrops along approximately 4600 miles of road by a traverse with car-mounted Geiger-Mueller equipment and laboratory tests of samples indicated that the most radioactive outcrops sampled in the state contained a maximum of 0.008% eU, 0.003% U, and 0.004% thoria; there may be about 1300 such outcrops and the most radioactive one has a probable content of only 0.055% eU, according to a statistical study; no high-grade deposits were found: 877.

MAINE (contd.)

General (contd.)
Uranium Exploration
Methods: 1101.
Mining laws: 1101.
Prospectors' guide: 1101.
Uranium Occurrences
General: black shales not abnormally radioactive, indicating that not all marine bituminous or carbonaceous rocks are appreciably uraniferous: 405; pyrochlore: 883; study of radioactivity of rock outcrops along approximately 4600 miles of road by traverse with car-mounted Geiger-Mueller equipment and laboratory tests of samples indicated that the most radioactive outcrops sampled in the state contained a maximum of 0.008% eU, 0.003% U, and 0.004% thoria; there may be about 1300 such outcrops and the most radioactive one has a probable content of only 0.055% eU, according to a statistical study; no high-grade deposits were found: 877.
Bibliography: 989.
Bibliography of U.S.G.S. reports: 572, 1004.
Black Shale, Uranium-bearing
General: black shales not abnormally radioactive, indicating that not all marine bituminous or carbonaceous rocks are appreciably uraniferous: 405.

Age Determinations
See under individual county names and under Index III, Age Determinations-Maine: 1037, 1038, 1039.

Allanite Occurrences
See under individual county names and under Index III, Thorium Occurrences-Maine: 655, 674, 692, 703, 787, 858, 900, 923, 984.

MAINE (contd.)

Androscoggin County
Age Determinations
Lewiston: analysis of sample from dike in city quarry, each value being followed by probable error (p.e.), gave: 1.74×10^{-5} cc.He/g (p.e. 0.10), 2.16×10^{-12} g.Ra/g. (p.e. 0.07), 0.92×10^{-6} g.Th/g. (p.e. 0.10), age, 170 m.y.: 1039.
Allanite Occurrences
Auburn
Mount Apatite: pegmatites contain allanite, autunite, gummite columbite, and zircon: 655; pegmatites worked by Maine Feldspar Co.; minerals reported from the area include beryl, allanite, autunite, columbite, gummite: 984.
Autunite Occurrences
Auburn: autunite, microlite, yttrocerite: 858.
Auburn
Mount Apatite: pegmatites contain allanite, autunite, gummite, columbite, and zircon: 655; pegmatites worked by Maine Feldspar Co.; minerals reported from the area include beryl, allanite, autunite, columbite, gummite: 984; autunite in pegmatite: 962.
Gummite Occurrences
Auburn
Mount Apatite: pegmatites contain allanite, autunite, gummite, columbite, and zircon: 655; pegmatites worked by Maine Feldspar Co.; minerals reported from the area include beryl, allanite, autunite, columbite, gummite: 984.
Microlite Occurrences
Auburn: autunite, microlite, yttrocerite: 858.
Radioactive Rocks
Lewiston: analysis of sample from dike in city quarry, each value being followed by probable error (p.e.), gave: 1.74×10^{-5} cc.He/g. (p.e. 0.10), 2.16×10^{-12} g.Ra/g. (p.e. 0.07), 0.92×10^{-6} g.Th/g. (p.e. 0.10), age, 170 m.y.: 1039.

MAINE (contd.)

Androscoggin County (contd.)
Radioactive Rocks
West Minot: radioactivity of granite sample: field analysis, 0.008% eU; laboratory analysis, 0.008% eU, 0.002% U, and 0.001% ThO_2: 877.
West Minot, 0.7 mi. NW of, on Maine Highway 124: radioactivity of Precambrian to Upper Paleozoic granite, estimated as 0.008% eU: 877.
Thorium Occurrences
Auburn: autunite, microlite, yttrocerite: 858.
Auburn
Mount Apatite: pegmatites contain allanite, autunite, gummite, columbite, and zircon: 655; pegmatites worked by Maine Feldspar Co.; minerals reported from the area include beryl, allanite, autunite, columbite, gummite: 984.
Lewiston: analysis of sample from dike in city quarry each value being followed by probable error (p.e.), gave: 1.74×10^{-5} cc. He/g. (p.e. 0.10), 2.16×10^{-12} g.Ra/g. (p.e. 0.07), 0.92×10^{-6} g. Th/g (p.e. 0.10), age, 170 m.y.: 1039.
West Minot: radioactivity of granite sample: field analysis, 0.008% eU; laboratory analysis, 0.008% eU, 0.002% U, and 0.001% ThO_2: 877.
Uranium Occurrences
Auburn: autunite, microlite, and yttrocerite: 858.
Auburn
Mount Apatite: pegmatites contain allanite, autunite, gummite, columbite, and zircon: 655; pegmatites worked by Maine Feldspar Co.; minerals

MAINE (contd.)

Androscoggin County (contd.)
Uranium Occurrences
Auburn
Mount Apatite: reported from the area include beryl, allanite, autunite, columbite, gummite: 984; autunite in pegmatite: 962.
West Minot: radioactivity of granite sample: field analysis, 0.008% eU; laboratory analysis, 0.008% eU, 0.002% U, and 0.001% ThO_2: 877.

Aroostock County
Radioactivity Occurrences
Winterville roadcut on Maine Highway 11 at top of hill, Winterville: radioactivity of rhyolite or andesite of Devonian (?) age with thin malachite coatings on joints, less than 0.03 mr/hr.: 843.
Littleton Ridge manganese prospect 5 mi. N of Houlton: radioactivity of manganese- and iron-rich shales of Silurian age, less than 0.03 mr/hr.: 843.
Henderson Hill manganese prospect on farm of Harry Thwaites 2.5 mi. SE of Houlton: radioactivity of manganese- and iron-rich shales of Silurian age, less than 0.03 mr/hr.: 843.
Starkey Corners molybdenum prospect 1 mi. S of Starkey Corners and 8 mi. N of Houlton: radioactivity of fractured, brecciated, mineralized limestone of Silurian age near contact with granite, less than 0.03 mr/hr.: 843.
Drews Hill sulfide prospects NE side Drews Hill 7 mi. W of Houlton: radioactivity of two samples of quartz veins with pyrite, galena, sphalerite (?), and stibnite in contact metamorphic zone between granite and limestone of Silurian age, less than 0.03 mr/hr.: 843.

MAINE (contd.)

Autunite Occurrences
See under individual county names and under Index III, Autunite Occurrences-Maine: 638, 639, 655, 690, 756, 783, 795, 848, 858, 931, 962, 984, 998, 1002, 1019, 1024, 1026, 1055, 1056, 1070, 1098, 1111.

Bibliographies
Thorium Occurrences: 989.
Uranium Occurrences: 989.
Bibliography of U.S.G.S. Reports: 572, 1004.

Black Shales, Uranium-Bearing
See under individual county names and under Index III, Black Shales, Uranium-bearing-Maine: 405.

Cumberland County
Radioactive Rocks
Bridgton: radioactivity of pink granite sample: field analysis, 0.007% eU; laboratory analysis, 0.008 and 0.006% eU, 0.001% U, and 0.002% ThO_2: 877.
Cornish, 2.1 mi. E of, at junction of Maine Highways 5 and 113: radioactivity of glacial material on Precambrian to Upper Paleozoic granite, estimated as 0.002-0.005% eU: 877.
Cornish, 6.5 mi. E of, on Maine Highway 11, 0.1 mi. N of junction with highway 113: radioactivity of glacial material on Precambrian to Upper Paleozoic granite, estimated as 0.002-0.003% eU: 877.
Crescent Lake, A area: radioactivity of pink granite sample: field analysis, 0.005% eU; laboratory analysis, 0.004% eU, 0.001% U; radioactivity of gray granite sample; field analysis, 0.004% eU; laboratory analysis, 0.003% eU, 0.001% U; radioactivity of biotite gneiss sample: field analysis 0.002% eU; no laboratory analysis figures: 877.

MAINE (contd.)

Cumberland County (contd.)
Radioactive Rocks
Crescent Lake, B area: radioactivity of gray granite sample: field analysis, 0.005-% eU; laboratory analysis, 0.004 and 0.005% eU, 0.000% U, and 0.003 and 0.004% ThO_2: 877.
Hiram, 3.1 and 4.5 mi. E of, on Hiram-Sebago unnumbered road: radioactivity of glacial material on Precambrian gneiss and schist, estimated as 0.002-0.003% eU: 877.
Long Lake: radioactivity of granite, gneiss, and schist sample: field analysis, 0.008% eU; laboratory analysis, 0.006 and 0.007% eU, 0.002 and 0.003% U, and 0.001% ThO_2: 877.
Maine Highway 11, Locations on-
Crescent Lake, 1.0 mi. NE of post office on highway 11: radioactivity of granite in Precambrian gneiss and schist, estimated as 0.005% eU: 877.
Crescent Lake, just W of, on highway 11, 4.3 mi. E of junction with highway 121: radioactivity of unidentified rock in Precambrian to Upper Paleozoic granite, estimated as 0.005-0.007% eU: 877;
4.4 to 4.7 mi. E of junction with highway 121: radioactivity of unidentified rock in Precambrian gneiss and schist, estimated as 0.004-0.007% eU: 877.
Crescent Lake, West along Highway 11 from junction with unnumbered road on E side of Thompson Lake: radioactivity of glacial material on Precambrian gneiss and schist, estimated as 0.004-0.007% eU:877.
Crescent Lake, 1.5 mi. W of, on highway 11: radioactivity of unidentified rock in Precambrian gneiss and schist, estimated as 0.006-0.007% eU: 877.
Crescent Lake, 1.0 mi. W of post office, on highway 11: radioactivity of gneiss in Precambrian gneiss and schist, estimated as 0.002% eU: 877.

MAINE (contd.)

Cumberland County (contd.)
Radioactive Rocks
Maine Highway 11, Locations on-
Crescent Lake, 1.6 mi. W of post office, on highway 11: radioactivity of granite in Precambrian gneiss and schist, estimated as 0.004% eU: 877.
Crescent Lake, 1.9 mi. W of post office, on highway 11: radioactivity of gneiss in Precambrian gneiss and schist, estimated as 0.004%+ eU: 877.
Crescent Lake, SW on highway 11 and then N on highway 121 to Casco: radioactivity of glacial material on Precambrian gneiss and schist, estimated as 0.004% eU:877.
East Sebago, 0.3 mi. SW of, on highway 11: radioactivity of an outcrop of Precambrian to Upper Paleozoic granite, estimated as 0.003% eU: 877.
East Sebago, 3 mi. of road SW of, on highway 11; radioactivity of glacial material on Precambrian to Upper Paleozoic granite, estimated as 0.002-0.004% eU;877.
Naples, 0.7 mi. E of drawbridge, on highway 11: radioactivity of gray to pink granite in Precambrian gneiss and schist, estimated as 0.004% eU: 877.
Naples, 0.6 mi. SE of, on highway 11 to junction with highway 35: radioactivity of glacial material on Precambrian gneiss and schist, estimated as 0.002-0.006% eU: 877.
Maine highway 35
Harrison to Naples on highway 35: radioactivity of glacial material on Precambrian gneiss and schist, estimated as 0.004-0.007% eU: 877.

MAINE (contd.)

Cumberland County (contd.)
Radioactive Rocks
Maine Highway 35
Harrison, 2.3 mi. S of, on highway 35: radioactivity of unidentified rock in Precambrian gneiss and schist, estimated as 0.003% eU: 877.
Harrison, 2.8 mi. S of, on highway 35: radioactivity of Precambrian gneiss and schist, estimated as 0.003% eU: 877.
Harrison, 5.5 mi. S of, on highway 35: radioactivity of Precambrian gneiss and schist, estimated as 0.003%-0.006% eU: 877.
Harrison, 6.0 mi. S of, on highway 35: radioactivity of Precambrian gneiss and schist, estimated as 0.008% eU: 877.
Harrison, 6.5 mi. S of, on highway 35: radioactivity of Precambrian gneiss and schist, estimated as 0.006-0.007% eU: 877.
Naples, 0.6 mi. N of, on highway 35: radioactivity of Precambrian gneiss and schist, estimated as 0.003% eU: 877.
Naples, 1 mi. E of, on highway 35, 2 mi. S of junction with highway 11: radioactivity of glacial material on Precambrian gneiss and schist, estimated as 0.004-0.006% eU: 877.
Naples, 3.2 mi. SE of, on highways 35 and 302: radioactivity of unidentified rock in Precambrian gneiss and schist, estimated as 0.005-0.007% eU: 877.
Maine Highway 107
Bridgton, 3.4 to 3.8 mi. S of, on highway 107: radioactivity of granite in Precambrian gneiss and schist, estimated as 0.004-0.007% eU: 877.
Bridgton, 5.3 mi. S of, on highway 107: radioactivity of granite in Precambrian gneiss and schist, estimated as 0.003-0.005% eU:877.
Bridgton, 5.9 mi. S of, on highway 107: radioactivity of glacial material on Precambrian gneiss and schist, estimated as 0.002-0.004% eU: 877.

MAINE (contd.)

Cumberland County (contd.)
Radioactive Rocks
Maine Highway 107
Sebago, 7 mi. S of South Bridgton, on highway 107: radioactivity of glacial material on Precambrian gneiss and schist, estimated as 0.003-0.004% eU:877.
South Bridgton, 1.0 to 1.2 mi. S of, on highway 107: radioactivity of glacial material on Precambrian gneiss and schist, estimated as 0.002-0.004% eU: 877.
South Bridgton, 3.8 and 5.7 mi. S of, on highway 107: radioactivity of granite in Precambrian gneiss and schist, estimated as 0.004-0.005% eU: 877.
South Bridgton, 5.0 mi. S of, on highway 107: radioactivity of granite in Precambrian gneiss and schist, estimated as 0.003-0.006% eU: 877.
South Bridgton, 6.1 mi. S of, on highway 107: radioactivity of granite in Precambrian gneiss and schist, estimated as 0.002-0.003% eU: 877.
Maine Highway 121
Casco N to Otisfield on highway 121: radioactivity of glacial material on Precambrian gneiss and schist, estimated as 0.003-0.004% eU, and, at Otisfield, 0.007% eU: 877.
East Otisfield, from the town to a point 3 mi. N of, on highway 121: radioactivity of glacial material on Precambrian gneiss and schist, estimated as 0.002-0.004% eU: 877.
Otisfield, 1.5 mi. N of, on highway 121: radioactivity of pegmatite, diorite, granite, in Precambrian gneiss and schist, estimated as 0.005-0.006% eU: 877.

MAINE (contd.)

Cumberland County (contd.)
Radioactive Rocks
Maine Highway 121
West Minot, at junction of highways 121 and 119: radioactivity of glacial material on Precambrian to Upper Paleozoic granite, estimated as 0.003% eU: 877.
Maine Highway 302
Bridgton, 2.7 mi. S of, on highway 302: radioactivity of pinkish granite in Precambrian gneiss and schist, estimated as 0.004% eU: 877.
Bridgton, 6.1 to 6.2 mi. S of, on highway 302: radioactivity of granite in Precambrian gneiss and schist, estimated as 0.004% eU: 877.
Bridgton, 7.2 mi. S of, on highway 302: radioactivity of granite in Precambrian gneiss and schist, estimated as 0.005% eU: 877.
Maine Highway 302 W from Bridgton, 0.1 mi. to junction with highway 117 S on highway 117 to junction with highway 107: radioactivity of glacial material on Precambrian gneiss and schist, estimated as 0.002-0.005% eU: 877.
Naples, 2.5 mi. of road starting at, going N on highway 302: radioactivity of glacial material on Precambrian gneiss and schist, estimated as 0.003-0.007% eU: 877.
Naples, 3.3 mi. SE of, on highway 302: radioactivity of granite and pegmatite in Precambrian gneiss and schist, estimated as 0.003% eU; average radioactivity for glacial material in area is 0.003% eU: 877.
Naples, 5.2 mi. SE of, on highway 302: radioactivity of gneiss in Precambrian gneiss and schist, estimated as 0.004% eU: 877.

MAINE (contd.)

Cumberland County (contd.)
Radioactive Rocks
Maine Highway 302
Naples, 5.3 mi. SE of, on highway 302: radioactivity of gneiss in Precambrian to Upper Paleozoic granite, estimated as 0.004% eU: 877.
Naples, 5.4 mi. SE of, on highway 302: radioactivity of gneiss and schist in Precambrian to Upper Paleozoic granite estimated as 0.004% eU: 877.
Naples, 5.6 and 7.3 mi. SE of, on highway 302: radioactivity of Precambrian to Upper Paleozoic granite, estimated as 0.003% eU: 877.
Naples: radioactivity of pink granite sample: field analysis, 0.004% eU; laboratory analysis, 0.003% eU, 0.001% U: 877.
North Sebago, 3.2 mi. N of, on Maine Highways 11 and 114: radioactivity of an outcrop of Precambrian gneiss and schist, estimated as 0.005-0.007% eU: 877.
Road from East Sebago to Naples along Maine Highways 11 and 114: radioactivity of glacial material on Precambrian granite, gneiss, and schist, estimated as 0.002-0.004% eU: 877.
Thorium Occurrences
Bridgton: radioactivity of pink granite sample: field analysis, 0.007% eU; laboratory analysis, 0.008 and 0.006% eU, 0.001% U, and 0.002% ThO_2: 877.
Crescent Lake, B area: radioactivity of gray granite sample: field analysis, 0.005-% eU; laboratory analysis, 0.004 and 0.005% eU, 0.000% U, and 0.003 and 0.004% ThO_2: 877.
Long Lake: radioactivity of granite, gneiss, and schist sample: field analysis, 0.008% eU; laboratory analysis, 0.006 and 0.007% eU, 0.002 and 0.003% U, and 0.001% ThO_2: 877.

MAINE (contd.)

Cumberland County (contd.)

Uranium Occurrences

Bridgton: radioactivity of pink granite sample: field analysis, 0.007% eU; laboratory analysis, 0.008, and 0.006% eU, 0.001% U, and 0.002% ThO_2: 877.

Crescent Lake, A area: radioactivity of pink granite sample: field analysis, 0.005% eU; laboratory analysis, 0.004% eU, 0.001% U; radioactivity of gray granite sample: field analysis, 0.004% eU; laboratory analysis, 0.003% eU, 0.001% U; radioactivity of biotite gneiss sample: field analysis, 0.002%- eU; no laboratory analysis figures: 877.

Crescent Lake, B area: radioactivity of gray granite sample: field analysis, 0.005-% eU; laboratory analysis, 0.004 and 0.005% eU, 0.000% U, and 0.003 and 0.004% ThO_2: 877.

Long Lake: radioactivity of granite, gneiss, and schist sample: field analysis, 0.008% eU; laboratory analysis, 0.006 and 0.007% eU, 0.002 and 0.003% U, and 0.001% ThO_2: 877.

Naples: radioactivity of pink granite sample: field analysis, 0.004% eU; laboratory analysis, 0.003% eU, 0.001% U: 877.

Cyrtolite Occurrences

See under individual county names and under Index III, Cyrtolite Occurrences-Maine: 690, 858, 883, 1002, 1098.

Franklin County

Radioactive Rocks

Maine Highway 16

Oquossoc, 8.6 mi. W of, on highway 16: radioactivity of Silurian phyllite and schist, estimated as 0.003% eU: 877.

Oquossoc, 9.1 mi. W of, on highway 16: radioactivity of glacial material on Silurian phyllite and schist; estimated as 0.003% eU: 877.

MAINE (contd.)

Franklin County (contd.)

Radioactive Rocks

Maine Highway 17

Houghton, 3.8 to 4.8 mi. N of, on highway 17: radioactivity of glacial material on Silurian phyllite and schist, estimated as 0.003-0.0.004% eU: 877.

Houghton, 5.5 mi. N of, on highway 17: radioactivity of schist in Silurian phyllite and schist, estimated as 0.003% eU: 877.

North Jay: radioactivity of a granite, determined by weighted sum of radioactivity of its quartz, feldspar, muscovite, and biotite gave 3.3 and determined directly 3.39×10^{-12}: 827; granite, radioactivity, 3.39×10^{-12} g. Ra/g. rock: 899; biotite contained many irregular pleochroic haloes in this granite: 899; Ra content almost four times the average radioactivity of all rocks tested: 899; apparatus and procedure used for radioactivity determinations: 899.

(See also Franklin-Kennebec-Somerset Cos.: 984).

Franklin-Kennebec-Somerset Counties

Radioactive Minerals

Jay-Norridgewock area: a large area of Jay granite extending over these adjoining counties reported to have a high content of radioactive minerals, which were not named: 984.

Geophysical Exploration (Ground)

See under individual county names and under Index III, Geophysical Exploration (Ground)-Maine: 877.

Gummite Occurrences

See under individual county names and under Index III, Gummite Occurrences-Maine: 655,690, 756, 783, 858, 984, 1002, 1098, 1100, 1111.

MAINE (contd.)

Hancock County

Allanite Occurrences

Mount Desert Island: allanite-orthite reported: 692.

Monazite Occurrences

East Blue Hill: monazite in gneiss: 726.

Orthite Occurrences

Mount Desert Island: allanite-orthite reported: 692.

Radioactive Rocks

Augusta Bridge, at 8.3, 7.7, and 6.0 mi. W of, on Maine Highway 202: radioactivity of Holowell granite, estimated as 0.003% eU: 877.

East Orland: radioactivity of porphyritic granite sample: field analysis, 0.005% eU; laboratory analysis, 0.005% eU, 0.000% U:877.

Ellsworth, 5.7 mi. W of, on Maine Highway 3 and U.S. Highway 1 (alt.): radioactivity of granite porphyry in Precambrian to Upper Paleozoic granite, estimated as 0.003% eU: 877.

Ellsworth, 12.1 mi. W of, on Maine Highway 3 and U.S. Highway 1 (alt.): radioactivity of granite porphyry in Holowell granite, estimated as 0.004% eU: 877.

Franklin from quarry: granite of middle Paleozoic age, radioactivity 1.24 $\pm$ 0.25 x 10^{-12} g Ra/g rock (mean value), 3.5 $\pm$ 0.7 x 10^{-6} g U/g rock, no Th or Th/U ratio reported: 745.

Franklin, Quarry near: helium and radioactivity data for biotite granite (three different readings): 4.6 x 10^{-5} cc. He/g., 12.9 x 10^{-13} g. Ra/g., 9.87 x 10^{-6} g. Th/g., and activity 2.21 alphas/ mg./hr.; 2.58 x 10^{-5} cc.He/g., 12.4 x 10^{-13} g. Ra/g., 8.40 x 10^{-6} g. Th/g., and activity 2.03 alphas/mg./hr.; 4.35 x 10^{-5} cc. He/g., 14.1 x 10^{-13} g. Ra/g., 8.25 x 10^{-6} g. Th/g., and activity 2.19 alphas/mg./hr.: 803.

MAINE (contd.)

Hancock County (contd.)

Radioactive Rocks

Franklin, Quarries near: radioactivity determinations on three samples of Franklin granite gave the following results: first sample, analyzed by Keevil, 4.42 x 10^{-5} cc. He/g., 12.9 x 10^{-13} g. Ra/g., 9.87 x 10^{-6} g. Th/g., age 60 $\pm$ 5 m.y.; second sample, analyzed by Keevil, 2.65 x 10^{-5} cc. He/g., 8.40 x 10^{-6} g. Th/g.; third sample, 4.07 x 10^{-5} cc. He/g., 8.25 x 10^{-6} g. Th/g., age 56 $\pm$ 15 m.y., and 14.1 x 10^{-13} g. Ra/g. (according to Keevil) but 12.4 x 10^{-13} g. Ra/g. (according to Goodman): 746.

Mount Desert Island, 7 mi. N of Seal Harbor, 4.2 to 4.3 mi. N of junction of Maine Highways 3 and 198: radioactivity of Precambrian to Upper Paleozoic granite, estimated as 0.003% eU: 877.

Thorium Occurrences

East Blue Hill: monazite in gneiss: 726.

Franklin: thorium-uranium ratio of Paleozoic granitic type rock, 2.5; radioactivity of 3.55 x 10^{-6} g. U/g. rock and 8.84 x 10^{-6} g. Th/g. rock: 800.

Franklin, Quarry near: helium and radioactivity data for biotite granite, 2.58 x 10^{-5} cc. He/g., 12.4 x 10^{-13} g. Ra/g., 8.40 x 10^{-6} g. Th/g., and activity 2.03 alphas/mg./hr.: 803; helium and radioactivity data for biotite granite, 4.35 x 10^{-5} cc.He/g., 14.1 x 10^{-13} g.Ra/g., 8.25 x 10^{-6} g.Th/g., and activity 2.19 alphas/mg./hr.: 803; helium and radioactivity data for biotite granite, 4.6 x 10^{-5} cc. He/g., 12.9 x 10^{-13} g.Ra/g., 9.87 x 10^{-6} g.Th/g. and activity 2.21 alphas/mg./hr.: 803.

MAINE (contd.)

Hancock County (contd.)
Thorium Occurrences
Mount Desert Island: allanite-orthite reported: 692.
Uranium Occurrences
Franklin: thorium-uranium ratio of Paleozoic granitic type rock, 2.5; radioactivity of 3.55×10^{-6} g.U/g. rock and 8.84×10^{-6} g. Th/g. rock: 800.
Franklin from quarry: granite of middle Paleozoic age, radioactivity $1.24 \pm 0.25 \times 10^{-12}$ g. Ra/g. rock (mean value), $3.5 \pm 0.7 \times 10^{-6}$ g. U/g. rock, no Th or Th/U ratio reported: 745.

Hatchettolite Occurrences
See under individual county names and under Index III, Hatchettolite Occurrences-Maine: 690, 783, 858, 998, 1111.

Kennebec County
Allanite Occurrences
Wayne: allanite in granite: 787.
Thorium Occurrences
Wayne: allanite in granite: 787.
(See also Franklin-Kennebec-Somerset Cos.: 984.)

Knox County
Allanite Occurrences
Fox Island: allanite in granite: 787.
Hurricane Island: allanite: 858.
Vinalhaven: allanite in granite: 787; allanite: 858.
Cyrtolite Occurrences
Rockport: cyrtolite in pegmatites: 883.
Radioactive Rocks
Hurricane Island: granite gave radioactivity of 3.74×10^{-12} g. Ra/g. rock: 898; redetermined radioactivity of granite, 2.79×10^{-12} g. Ra/g. rock: 899; apparatus and procedure used in making radioactivity determinations: 898, 899.

MAINE (contd.)

Knox County (contd.)
Thorium Occurrences
Fox Island: allanite in granite: 787.
Hurricane Island: allanite: 858.
Rockport: cyrtolite in pegmatites: 883.
Vinalhaven: allanite in granite: 787; allanite: 858.
Uranium Occurrences
H.G. Starett spodumene prospect near Warren: some small grains of uranium minerals and white beryl are present in pegmatite: 1100.
Rockport: cyrtolite in pegmatites: 883.

Lincoln County
Allanite Occurrences
Somerville: allanite: 858.
Thorium Occurrences
Somerville: allanite: 858.

Microlite Occurrences
See under individual county names and under Index III, Microlite Occurrences-Maine: 638, 752, 756, 783, 858, 891, 938, 945, 998, 1111.

Monazite Occurrences
See under individual county names and under Index III, Thorium Occurrences-Maine: 104, 726, 925, 938, 948, 1026, 1038.

Orthite Occurrences
See under individual county names and under Index III, Thorium Occurrences-Maine: 692.

Oxford County
Allanite Occurrences
Norway: allanite: 858.
Pleasant Mountain: traces of allanite in analcime syenite of White Mountain magma series: 674.
Stoneham: allanite: 858.

MAINE (contd.)

Oxford County (contd.)
Autunite Occurrences
Albany
Guy Johnson mine: autunite, beryl, torbernite among rare and accessory minerals in pegmatite; geology, description: 690.
Wardwell No. 1 mine: autunite, beryl, torbernite, questionable occurrence of uraninite, among rare and accessory minerals in pegmatite; geology, description: 690.
Wardwell quarry: autunite: 1019.
Buckfield
Bennett feldspar quarry: autunite, columbite-tantalite, cookeite, hatchettolite among rare and accessory minerals in pegmatite; geology, description: 690.
Hooper's Ledge feldspar quarry, abandoned, NE of South Paris and S of Mt. Mica: dark smokey quartz, autunite in pegmatite: 962.
Lord Hill near Kezar Lake: autunite among minerals in feldspar quarry no longer being worked: 931.
Newry: autunite, gummite, hatchettolite,, torbernite, microlite, uraninite: 858; in feldspar quarries, small brown crystals of zircon with autunite, albite, columbite, and smokey quartz: 1070; in quarry, autunite, gummite, hatchettolite in minute crystals, microlite, pyrochlore, torbernite, uraninite in very small crystals and masses, uranophane: 783.
Dunton tourmaline deposit: microlite in cleavelandite, columbite, pitchblende largely altered to gummite and autunite crusts: 756.
Dunton tourmaline mine: pegmatite sill-like mass contains beryl, columbite, and autunite as minor constituents: 655.
Newry Hill (formerly Halls Ridge): autunite: 858.

MAINE (contd.)

Oxford County (contd.)
Autunite Occurrences
Newry
Newry Hill
Dunton pegmatite: this pegmatite was mined at various times for gem tourmaline, pollucite, and for feldspar; it has six zones and is an irregularly shaped lens about 190 ft. long and 10 ft. thick; among minerals reported in it are autunite, gummite, hachettolite or uranium pyrochlore, microlite, torbernite, uraninite, and uranophane: 1111.
Main pegmatite: this is the largest pegmatite body in the area and is a gently dipping tabular lens 2,450 ft. long and inferred to be about 100 ft. thick; many small prospect pits have been made in this pegmatite but the only sizeable workings are at the Nevel mine; this pegmatite has seven zones, many fracture-controlled replacement units of medium to small size, and one large replacement body; among minerals reported from this pegmatite are autunite, torbernite, and uraninite: 1111.
Nevel mine: one of the prospects being worked in the Main pegmatite; autunite, torbernite, and uraninite have been reported here: 1111; autunite, cyrtolite, gummite, microlite, torbernite: 858; autunite in pegmatite: 962; pegmatite formerly worked for pollucite and spodumene but work ceased in 1929; mine is one of best localities in state for collecting rare minerals which include: autunite, gummite, torbernite, uranopilite: 984.

MAINE (contd.)

Oxford County (contd.)
Autunite Occurrences
Newry
Newry mine: autunite in minute crystals, hatchettolite, microlite in small crystals, and uraninite: 998; autunite, beryl, columbite-tantalite, gummite, hatchettolite, uraninite, zircon among rare and accessory minerals in pegmatite; geology, description: 690.
Paris
Mount Mica: autunite, yttrocerite, and zircon among many minerals present here in gem-bearing pegmatite: 655; autunite in pegmatite: 962.
Mount Mica mine: autunite, yttrocerite, gem minerals: 795.
Paris-Rumford area: questionable occurrence since unidentified, yellow, platy mineral forms crust on fracture walls, resembles autunite, and is one of latest minerals in Lord Hill pegmatite: 1024.
Rumford: autunite, columbite, microlite: 638; autunite, microlite, torbernite: 858.
Black Mountain: autunite in pegmatite: 962; autunite, columbite associated with tourmaline deposit in pegmatite: 639; autunite, microlite, torbernite (rare), uranopilite: 858; uraninite in pegmatite minerals, as minute crystals in or on cleavelandite in form of a dendritic growth; some uraninite altered to gummite, autunite, uranophane, and other secondary uranium minerals; crytolite present as small, well-formed crystals embedded in feldspar and associated with uraninite and manganese dioxide: 1098.
Black Mountain quarries: autunite, beryl, columbite-tantalite, cyrtolite, uraninite, uranophane, zircon among rare and accessory minerals in pegmatite; geology, description: 690.

MAINE (contd.)

Oxford County (contd.)
Autunite Occurrences
Rumford
Rumford mica mine on NW side of Black Mountain: hydrothermal minerals in the pegmatite include abundant autunite, uraninite, cyrtolite imbedded in feldspar and associated with uraninite and manganese oxide, uranophane as a crust on feldspar; uraninite occurs as minute crystals and on cleavelandite and shows some alteration to gummite, autunite, uranophane, and other secondary uraninites: 1002.
Stoneham
Harndon Hill: autunite in pegmatite: 962; autunite among minerals present in pegmatite: 655.
Witt Hill in Greenwood: autunite specks in solid rock; chrysoberyl, garnet, spinel, and zircon also present: 848.
Cyrtolite Occurrences
Newry
Newry Hill
Nevel Mine: autunite, cyrtolite, gummite, microlite, torbernite: 858.
Rumford
Black Mountain: uraninite in pegmatite minerals, as minute crystals in or on cleavelandite in form of a dendritic growth; some uraninite altered to gummite, autunite, uranophane, and other secondary uranium minerals; cyrtolite present as small, well-formed crystals embedded in feldspar and associated with uraninite and manganese dioxide: 1098.

MAINE (contd.)

Oxford County (contd.)
Cyrtolite Occurrences
Rumford
Black Mountain quarries: autunite, beryl, columbite-tantalite, cyrtolite, uraninite, uranophane, zircon among rare and accessory minerals in pegmatite; geology, description: 690.
Rumford mica mine on NW side of Black Mountain: hydrothermal minerals in the pegmatite include abundant autunite, uraninite, cyrtolite imbedded in feldspar and associated with uraninite and manganese oxide, uranophane as a crust on feldspar; uraninite occurs as minute crystals and on cleavelandite and shows some alteration to gummite, autunite, uranophane, and other secondary uraninites: 1002.
Gummite Occurrences
Greenwood
Harvard quarry on W slope of Noyes Mountain: beryl, columbite-tantalite, gummite, hatchettolite, samarskite, uraninite, zircon among rare and accessory minerals in pegmatite; geology, description: 690.
Newry: autunite, gummite, hatchettolite, torbernite, microlite, uraninite: 858; in quarry, autunite, gummite, hatchettolite in minute crystals, microlite, pyrochlore, torbernite, uraninite in very small crystals and masses, uranophane: 783.
Dunton tourmaline deposit: microlite in cleavelandite, columbite, pitchblende largely altered to gummite and autunite crusts: 756.
Newry Hill (formerly Halls' Ridge): Dunton pegmatite on Plumbago Mountain contained a few grains of uraninite mostly altered to gummite, and uranophane, and some grey beryl and beryllonite: 1100.

MAINE (contd.)

Oxford County (contd.)
Gummite Occurrences
Newry
Newry Hill
Dunton pegmatite: this pegmatite was mined at various times for gem tourmaline, pollucite, and for feldspar; it has six zones and is an irregularly shaped lens about 190 ft. long and 10 ft. thick; among minerals reported in it are autunite, gummite, hachettolite or uranium pyrochlore, microlite, torbernite, uraninite and uranophane: 1111.
Nevel Mine: autunite, cyrtolite, gummite, microlite, torbernite: 858; pegmatite formerly worked for pollucite and spodumene but work ceased in 1929; mine is one of best localities in state for collecting rare minerals which include: autunite, gummite, torbernite, uranopilite: 984.
Newry mines: autunite, beryl, columbite-tantalite, gummite, hatchettolite, uraninite, zircon among rare and accessory minerals in pegmatite: geology, description: 690.
Rumford
Black Mountain: uraninite in pegmatite minerals, as minute crystals in or on cleavelandite in form of a dendritic growth; some uraninite altered to gummite, autunite, uranophane, and other secondary uranium minerals; cyrtolite present as small, well-formed crystals embedded in feldspar and associated with uraninite and manganese dioxide: 1098.

MAINE (contd.)

Oxford County (contd.)
Gummite Occurrences
Rumford
Rumford mica mine on NW side of Black Mountain: hydrothermal minerals in the pegmatite include abundant autunite, uraninite, cyrtolite imbedded in feldspar and associated with uraninite and manganese oxide, uranophane as a crust on feldspar; uraninite occurs as minute crystals and on cleavelandite and shows some alteration to gummite, autunite, uranophane, and other secondary uraninites: 1002.
Microlite Occurrences
Newry: autunite, gummite, hatchettolite, torbernite, microlite, uraninite: 858; microlite among minerals in group of four pegmatites described as to origin, structure, and mineralogy: 945; in quarry, autunite, gummite, hatchettolite in minute crystals, microlite, pyrochlore, torbernite, uraninite in very small crystals and masses, uranophane: 783.
Dunton tourmaline deposit: microlite in cleavelandite, columbite, pitchblende largely altered to gummite and autunite crusts: 756.
Newry Hill
Dunton Pegmatite: this pegmatite was mined at various times for gem tourmaline, pollucite, and for feldspar; it has six zones and is an irregularly shaped lens about 190 ft. long and 10 ft. thick; among minerals reported in it are autunite, gummite, hatchettolite or uranium pyrochlore, microlite, torbernite, uraninite, and uranophane: 1111.
Nevel mine: autunite, cyrtolite, gummite, microlite, torbernite: 858.

MAINE (contd.)

Oxford County (contd.)
Microlite Occurrences
Newry
Newry mine: autunite in minute crystals, hatchettolite, microlite in small crystals, and uraninite: 998.
Rumford: autunite, columbite, microlite: 638; autunite, microlite, torbernite: 858.
Black Mountain: microlite in pegmatite ledge; microlite, mineralogical description, quantitative chemical analysis made but results not listed: 752; autunite, microlite, torbernite (rare), uranopilite: 858.
Hatchettolite Occurrences
Buckfield
Bennett feldspar quarry: autunite, columbite-tantalite, cookeite, hatchettolite among rare and accessory minerals in pegmatite; geology, description: 690.
Greenwood
Harvard quarry on W slope of Noyes Mountain: beryl, columbite-tantalite, gummite, hatchettolite, samarskite, uraninite, zircon among rare and accessory minerals in pegmatite; geology, description: 690.
Newry: autunite, gummite, hatchettolite, torbernite, microlite, uraninite: 858; in quarry, autunite, gummite, hatchettolite in minute crystals, microlite, pyrochlore, torbernite uraninite in very small crystals and masses, uranophane: 783.

MAINE (contd.)

Oxford County (contd.)
Hatchettolite Occurrences
Newry
Newry Hill
Dunton pegmatite: this pegmatite was mined at various times for gem tourmaline, pollucite, and for feldspar; it has six zones and is an irregularly shaped lens about 190 ft. long and 10 ft. thick; among minerals reported in it are autunite, gummite, hatchettolite or uranium pyrochlore, microlite, torbernite, uraninite, and uranophane:1111.
Newry mine: autunite in minute crystals, hatchettolite, microlite in small crystals, and uraninite: 998; autunite, beryl, columbite-tantalite, gummite, hatchettolite, uraninite, zircon among rare and accessory minerals in pegmatite; geology, description: 690.
Pitchblende Occurrences
Newry
Dunton tourmaline deposit: microlite in cleavelandite, columbite, pitchblende largely altered to gummite and autunite crusts:756.
Pyrochlore Occurrences
Greenwood: pyrochlore occurs in albite associated with zircon crystals and is rare: 988.
Newry, Quarry at: autunite, gummite, hatchettolite in minute crystals, microlite, pyrochlore, torbernite, uraninite in very small crystals and masses, uranophane: 783.
Newry Hill
Dunton pegmatite: this pegmatite was mined at various times for gem tourmaline, pollucite, and for feldspar; it has six zones and is an irregularly shaped lens about 190 ft. long and 10 ft. thick; among minerals reported in it are autunite, gummite, hatchettolite or uranium pyrochlore,

MAINE (contd.)

Oxford County (contd.)
Pyrochlore Occurrences
Newry
Newry Hill
microlite, torbernite, uraninite and uranophane: 1111
Radioactive Rocks
Albany
Bumpus mine: pegmatite examined with Geiger counter gave few readings equal to twice the background count and most of these were associated with large masses of perthite; much of this mine was inaccessible because of water conditions: 887.
Donahue prospect: pegmatite examined with Geiger counter gave readings either more than twice the background count or too high to be recorded on the most sensitive scale at places where black minerals, uraninite (?), were found surrounded by smoky quartz or perthite stained a dark color, this color fading out gradually away from the black mineral; some uraninite (?) crystals were discovered within two feet of the granite wall rock, apparently in the wall zone: 887.
Ernest Wentworth mine in pegmatite 2 mi. W of Hutchinson pond: pegmatite occurrences numerous in area, as are small prospect pits, and examination with Geiger counter gave readings too high to be recorded on the most sensitive scale in areas where black mineral crystals, uraninite (?) were found in stained perthite masses, some in the core-margin zone and others in large loose pegmatite blocks on the pit floor: 887.

MAINE (contd.)

Oxford County (contd.)
Radioactive Rocks
Albany
Fred Scribner mine: pegmatite examined with Geiger counter gave readings of more than twice the background count but no specimens of uraninite were seen: 887.
Guy Johnson prospect: pegmatite examined with Geiger counter; no report of readings given: 887.
Stearns Mountain mine: pegmatite examined with Geiger counter gave readings either more than twice the background count or too high to be recorded on the most sensitive scale at places where black minerals, uraninite (?), were surrounded by smoky quartz or perthite stained a dark color, this color fading out gradually away from the black mineral; the minerals are associated with the core-margin zone here: 887.
Wardwell mine: pegmatite examined with Geiger counter; the highest readings were equal to 2 or 2½ times the background count, the majority of these being located along contacts of pegmatite with wall rock or along the margins of inclusions of gneiss in pegmatite: 887.
Beech Hill mine at Waterford: pegmatite examined with Geiger counter gave only four readings more than twice the background count and of these three were located at the contact with the wall rock; no uraninite specimens were seen: 887.
Cornish, 0.1 mi. E of, at junction of Maine Highways 5 and 25: radioactivity of glacial material on Precambrian and Upper Paleozoic granite, estimated as 0.002-0.004% eU: 877.

MAINE (contd.)

Oxford County (contd.)
Radioactive Rocks
East Brownfield, 4.7 mi. NW of, on Maine Highways 5 and 113: radioactivity of granite in Precambrian gneiss and schist, estimated as 0.003% eU: 877.
East Brownfield to Fryeburg on Maine Highways 5 and 113: radioactivity of glacial material on Precambrian to Upper Paleozoic granite, estimated as 0.002-0.005% eU: 877.
Greenwood
Noyes Mountain, abandoned mica-gem quarry on S slope of, 4 mi. SW of West Paris: pegmatite examined with Geiger counter gave readings mostly less than twice the background count except in certain parts which contained abundant garnet and black tourmaline and gave consistently high readings, some too high to be reported on the most sensitive scale of the counter: 887.
Nubble mica mine about 4 mi. SW of West Paris: pegmatite examined with Geiger counter gave normal reading for pegmatites except in two veinlike zones containing abundant biotite mica and garnet and some smoky quartz and muscovite mica, which were traced along the strike of the pegmatite and gave consistently high readings throughout their extent averaging more than 2½ times the background count: 887.
Hibbs mine in Hebron: pegmatite examined with Geiger counter gave readings either more than twice the background count or too high to be recorded on the most sensitive scale, at places where black minerals, uraninite (?), were found surrounded by smoky quartz or perthite stained a dark color, this

MAINE (contd.)

Oxford County (contd.)
Radioactive Rocks
Hibbs mine in Hebron: color fading out gradually away from the black minerals: 887.
Hiram: radioactivity of glacial material on Precambrian gneiss and schist, estimated as 0.002-0.003% eU: 877.
Hiram, 1.2 to 2.0 mi. N of, on Maine Highway 117: radioactivity of granite in Precambrian to Upper Paleozoic granite , estimated as 0.003% eU: 877.
John Lobiskis mine at West Peru: pegmatite examined with Geiger counter gave few readings equal to twice the background count and most of these were associated with large masses of perthite: 887.
Maine Highway 5
Andover, 4.7 mi. N of, on highway 5: radioactivity of gneiss in Precambrian to Upper Paleozoic granite, estimated as 0.002-0.003% eU: 877.
Lovell, 1 mi. S. of, on highway 5: radioactivity of glacial material on Precambrian gneiss and schist, estimated as 0.001-0.003% eU: 877.
Rumford Point, 1.2 to 1.5 mi. N of, on highway 5: radioactivity of glacial material on Precambrian gneiss and schist, estimated as 0.002-0.003% eU: 877.
Rumford Point, 3.0 mi. N of, on highway 5: radioactivity of gneiss in Precambrian gneiss and schist, estimated as 0.002-0.003% eU: 877.
Maine Highway 11
Limerick, 2 mi. SW of, on highway 11: radioactivity of glacial material on Precambrian gneiss and schist, estimated as 0.003% eU: 877.
Limerick, 5.2 mi, SW of, on highway 11: radioactivity of gneissic rocks in Precambrian gneiss and schist, estimated as 0.003% eU: 877.

MAINE (contd.)

Oxford County (contd.)
Radioactive Rocks
Maine Highway 11
Limerick, 5.7 mi. SW of, on highway 11: radioactivity of glacial material on Precambrian gneiss and schist, estimated at 0.003-0.004% eU: 877.
Limerick, 8.2 mi. SW of, on highway 11: radioactivity of glacial material on Precambrian gneiss and schist; estimated as 0.002-0.004% eU: 877.
Limerick, 8.7 mi. SW of, on highway 11: radioactivity of glacial material on Precambrian gneiss and schist, estimated as 0.005-0.006% eU: 877.
Maine Highway 16
Oquossoc, 19.2 mi. W. of, on highway 16: radioactivity of glacial material on Precambrian to Upper Paleozoic granite, estimated as 0.003% eU: 877.
Maine Highway 17
Houghton, 0.7 mi. S of, on highway 17: radioactivity of glacial material on Precambrian gneiss and schist, estimated as 0.003% eU: 877.
Roxbury, 2 mi. S of, on highway 17: radioactivity of glacial material on Precambrian to Upper Paleozoic granite, estimated as 0.003% eU: 877.
Maine Highway 25
Kezar Falls, 2.6 mi. W. of, on highway 25: radioactivity of glacial material on Precambrian to Upper Paleozoic granite, estimated as 0.002-0.004% eU: 877.
Kezar Falls, 4.5 mi. W of, on highway 25: radioactivity of glacial material on Precambrian to Upper Paleozoic granite, estimated as 0.003-0.004% eU: 877.

MAINE (contd.)

Oxford County (contd.)
Radioactive Rocks
Maine Highway 26
Mechanic Falls to Welchville along highway 26: radioactivity of glacial material on Precambrian gneiss and schist, estimated as 0.002-0.006% eU: 877.
North Newry, 6.3 mi. NW of, on highway 26: radioactivity of granite pegmatite, lime silicate rocks in Precambrian to Upper Paleozoic granite, estimated as 0.002-0.003% eU: 877.
South Paris, 5.2 to 5.3 mi. N of, on highway 26: radioactivity of gneiss and pegmatite in Precambrian gneiss and schist, estimated as 0.003% eU: 877.
Maine Highway 35
Waterford, 0.3 mi. N of, on highway 35: radioactivity of granite in Precambrian gneiss and schist, estimated as 0.004% eU: 877.
Waterford, 4.0 mi. of road N of, on highway 35: radioactivity of glacial material on Precambrian gneiss and schist, estimated as 0.002-0.006% eU: 877.
Maine Highway 37
East Waterford to Waterford on highway 37: radioactivity of glacial material on Precambrian gneiss and schist, estimated as 0.003-0.004% eU: 877.
Waterford on highway 37: radioactivity of granite in Precambrian gneiss and schist, estimated as 0.004% eU: 877.
Maine Highway 110
West Newfield, 2.3 mi. W of, on highway 110: radioactivity of glacial material on Precambrian to Upper Paleozoic granite, estimated as 0.006% eU: 877.

MAINE (contd.)

Oxford County (contd.)
Radioactive Rocks
Maine Highway 110
West Newfield, from junction with highway 153, 2.9 mi. W of, northward on highway 153 to Effingham: radioactivity of glacial material on Precambrian to Upper Paleozoic granite, estimated as 0.003-0.005% eU: 877.
Maine Highway 113
Stow, 0.4 mi. N of, on highway 113: radioactivity of pegmatite and gneiss in Precambrian gneiss and schist, estimated as 0.003-0.004% eU: 877.
Stow, 9.0 mi. N of, on highway 113: radioactivity of gneiss in Precambrian gneiss and schist, estimated as 0.002-0.003% eU: 877.
Stow, 9.3 mi. N. of, on highway 113: radioactivity of gneiss and pegmatite in Precambrian gneiss and schist, estimated as 0.002-0.003% eU: 877.
Stow, at 10.4 and 10.5 mi. N of, on highway 113: radioactivity of gneiss and schist in Precambrian gneiss and schist, estimated as 0.003-0.004% eU: 877.
Stow, 10.7 mi. N. of, on highway 113: radioactivity of phyllite, schist, and pegmatite in Precambrian gneiss and schist, estimated as 0.003-0.005% eU: 877.
Stow, 11.0 mi. N. of, on highway 113: radioactivity of gneiss and schist in Precambrian gneiss and schist, estimated as 0.003-0.004% eU: 877.
Stow, 11.2 mi. N. of, on highway 113: radioactivity of gneiss and schist in Precambrian gneiss and schist, estimated as 0.004-0.007 eU: 877.

Oxford County (contd.)
Radioactive Rocks
Maine Highway 113
Stow, 13 mi. N. of, on highway 113: radioactivity of dark gray gneissic rock in Precambrian gneiss and schist, estimated as 0.002-0.003% eU: 877.
Stow, 15.9 mi. N. of, on highway 113: radioactivity of gneiss, schist, and pegmatite in Precambrian gneiss and schist, estimated as 0.003-0.004% eU, while at 17.1 mi. N. of Stow, it is estimated as 0.003% eU: 877.
Stow, 18.9 mi. N. of, on highway 113: radioactivity of crystalline Precambrian gneiss and schist, estimated as 0.002-0.003% eU: 877.
Maine Highway 118
Norway Lake to East Waterford on highway 118: radioactivity of glacial material on Precambrian gneiss and schist, estimated as 0.004-0.006% eU: 877.
Maine Highway 119
Hebron, 3.3 mi. NW of, on highway 119: radioactivity of Precambrian to Upper Paleozoic granite, estimated as 0.004% eU: 877.
Hebron, 3.6 and 4.3 mi. NW of, on highway 119: radioactivity of glacial material on Precambrian to Upper Paleozoic granite, estimated as 0.003-0.004% eU: 877.
Minot to West Minot on highway 119: radioactivity of glacial material on Precambrian to Upper Paleozoic granite, estimated as 0.003-0.004% eU: 877.
Maine Highway 160
Brownfield to East Brownfield on highway 160: radioactivity of glacial material on Precambrian to Upper Paleozoic granite, estimated as 0.002-0.003% eU: 877.
Kezar Falls, 4.2 mi. N of, on highway 160: radioactivity of glacial material on Precambrian gneiss and schist, estimated as 0.003-0.005% eU: 877.

Oxford County (contd.)
Radioactive Rocks
Maine Highway 160
Kezar Falls, 4.2 to 6.0 mi. N of, on highway 160: radioactivity of glacial material on Precambrian gneiss and schist, estimated as 0.001-0.005% eU: 877.
Kezar Falls, 7.6 mi. N of, on highway 160: radioactivity of granite and pegmatite in Precambrian to Upper Paleozoic granite, estimated as 0.003% eU: 877.
Kezar Falls, 9.7 mi. N of, on highway 160: radioactivity of granite and pegmatite in Precambrian to Upper Paleozoic granite, estimated as 0.003-0.004% eU: 877.
Maine Highway 302
Fryeburg, 1.8 mi. E of, on highway 302: radioactivity of granite and pegmatite in Precambrian to Upper Paleozoic granite, estimated as 0.003% eU: 877.
Fryeburg to Bridgton on highway 302: radioactivity of glacial material on Precambrian to Upper Paleozoic granite, estimated as 0.002-0.005% eU; area has granite in west, gneiss and schist in east, and the road metal has a radioactivity of up to 0.008% eU: 877.
Fryeburg W to Conway, New Hampshire, on highway 302: radioactivity of road metal of Precambrian gneiss and schist, estimated as 0.003% eU: 877.

MAINE (contd.)

Oxford County (contd.)
Radioactive Rocks
Newry
Newry mine: pegmatite examined with Geiger counter gave readings either more than twice the background count or too high to be recorded on the most sensitive scale, at places where black minerals, uraninite (?), were found surrounded by smoky quartz or perthite stained a dark color, this color fading out gradually away from the black mineral; the minerals are probably associated with the core-margin zone here: 887.

North Fryeburg: radioactivity of glacial material on Precambrian gneiss and schist, estimated as 0.002-0.003% eU: 877.

Norway: radioactivity of glacial material on Precambrian gneiss and schist, estimated as 0.004-0.006% eU: 877.

Reynolds mine at Canton: pegmatite examined with Geiger counter gave few readings equal to twice the background count and most of these were associated with large masses of perthite: 887.

Rumford: Red hill pegmatites examined with Geiger counter showed an average of 1.5 to 2.0 times the background count exclusive of 7 readings which were too high to be recorded on the most sensitive scale; certain portions, showing greater radioactivity, contain a small black mineral grain, uraninite (?), surrounded by smoky quartz and/or stained, discolored feldspar, such grains seeming to be confined to the wall-zones and core-margin zones: 887.

MAINE (contd.)

Oxford County (contd.)
Radioactive Rocks
Rumford
Black Mountain mine, 5 mi. NNW of Rumford: pegmatites examined with Geiger counter gave high readings on stained surfaces along joints cutting various parts of the pegmatite; readings on the stained surfaces varied from too high to be recorded on the most sensitive scale of the counter, to considerably above the background count or just the normal pegmatite count; these stained surfaces typically were shiny blue-black and iridescent but some were dull and had a black sooty coating; counts on large perthite crystals were double the background count, while those for quartz crystals about equalled the background count: 887.

George Elliot mine: pegmatite examined with Geiger counter gave readings of more than twice the background count but no uraninite specimens were seen; the schist inclusions and wall rock contacts gave readings of three times the background count in some places but were low in others: 887.

Mount Mica near Paris: several uraninite (?) crystals were found in loose blocks of pegmatite on the dump and two others were located in the wall zone within 1½ ft. of the contact; readings on Geiger counter were either double the background count or too high to be recorded and the mineral was associated with smoky quartz or perthite stained a dark color: 887.

MAINE (contd.)

Oxford County (contd.)
Radioactive Rocks
Stoneham
Foster Hill mine: pegmatite examined with Geiger counter gave few readings equal to twice the background count and most of these were associated with large masses of perthite: 887.
Melrose quarry 5½ mi. WNW of East Stoneham on SE slope of Sugarloaf Mountain: pegmatite examined with Geiger counter gave normal readings for pegmatites except in certain portions where small black mineral grains, uraninite (?), were associated with smoky quartz and gave too high a reading to be recorded on the most sensitive scale; one sulphide vein, exposed for a length of 7 ft. and having a maximum width of 1 ft., cut the pegmatite at one place and consistently gave readings too high to be recorded by the counter, but an analysis of a one lb. sample of the material by U.S.G.S. reported its uranium content to be only 0.09% eU: 887.
U.S. Highway 2
Gilead to North Bethal, 6 mi. of the road from: radioactivity of glacial material on Precambrian gneiss and schist, estimated as 0.001-0.003% eU: 877.
West Bethel, 2.5 to 2.6 mi. of the road W of: radioactivity of metamorphic Precambrian gneiss and schist, estimated as 0.003% eU: 877.

MAINE (contd.)

Oxford County (contd.)
Radioactive Rocks
Woolwich
Trott Cove mine: pegmatite examined with a Geiger counter gave readings either more than twice the background count or too high to be recorded on the most sensitive scale, at places where black minerals, uraninite (?), were found surrounded by smoky quartz or perthite stained a dark color, this color fading out gradually away from the black mineral: 887.
Samarskite Occurrences
Greenwood
Harvard quarry on W slope of Noyes Mountain: beryl, columbite-tantalite, gummite, hatchettolite, samarskite, uraninite, zircon among rare and accessory minerals in pegmatite; geology, description: 690.
Thorium Occurrences
Albany
Wardwell No. 1 mine: autunite, beryl, torbernite, questionable occurrence of uraninite, among rare and accessory minerals in pegmatite; geology, description: 690.
Buckfield
Bennett feldspar quarry: autunite, columbite-tantalite, cookeite, hatchettolite, among rare and accessory minerals in pegmatite; geology, description: 690.
Greenwood: pyrochlore occurs in albite associated with zircon crystals and is rare: 988.
Harvard quarry on W slope of Noyes Mountain: beryl, columbite-tantalite, gummite, hatchettolite, samarskite, uraninite, zircon among rare and accessory minerals in pegmatite; geology, description: 690.

MAINE (contd.)

Oxford County (contd.)
Thorium Occurrences
Mt. Mica mine near Paris: autunite, yttrocerite, gem minerals: 795.
Newry: autunite, gummite, hatchettolite, microlite, torbernite, uraninite: 858.
Newry, Quarry at: autunite, gummite, hatchettolite in minute crystals, microlite, pyrochlore, torbernite, uraninite in very small crystals and masses, uranophane: 783.
Dunton tourmaline deposits: microlite in cleavelandite, columbite, pitchblende largely altered to gummite and autunite crusts: 756.
Newry Hill (formerly Halls Ridge)
Dunton pegmatite: at Plumbago Mountain, this pegmatite contained a few grains of uraninite mostly altered to gummite and uranophane, and some grey beryl and beryllonite: 1100; this pegmatite was mined at various times for gem tourmaline, pollucite, and for feldspar; it has six zones and is an irregularly shaped lens about 190 ft. long and 10 ft. thick; among minerals reported in it are autunite, gummite, hachettolite or uranium pyrochlore, microlite, torbernite, uraninite, and uranophane: 1111.
Main pegmatite: this is the largest pegmatite body in the area and is a gently dipping tabular lens 2,450 ft. long and inferred to be about 100 ft. thick; many small prospect pits have been made in this pegmatite but the only sizeable workings are at the Nevel mine; this pegmatite has seven zones, many fracture-controlled replacement units of medium to small size, and one large replacement body; among the minerals reported from this pegmatite are autunite, torbernite, and uraninite: 1111.

MAINE (contd.)

Oxford County (contd.)
Thorium Occurrences
Newry
Newry Hill
Nevel mine: one of the prospects being worked in the Main pegmatite; autunite, torbernite, and uraninite have been reported here: 1111; uraninite in new pit: 1053.
Newry mine: autunite in minute crystals, hatchettolite, microlite in small crystals, and uraninite: 998; autunite, beryl, columbite-tantalite, gummite, hatchettolite, uraninite, zircon among rare and accessory minerals in pegmatite; geology, description: 690.
Norway: allanite: 858.
Paris: yttrocerite: 858.
Pleasant Mountain: traces of allanite in analcime syenite of White Mountain magma series: 674.
Rumford: autunite, columbite, microlite: 638; autunite, microlite, torbernite: 858.
Black Mountain: microlite in pegmatite ledge; microlite, mineralogical description, quantitative chemical analysis made but results not listed: 752; uraninite in pegmatite minerals, as minute crystals in or on cleavelandite in form of a dendritic growth; some uraninite altered to gummite, autunite, uranophane, and other secondary uranium minerals; cyrtolite present as small, well-formed crystals embedded in feldspar and associated with uraninite and manganese dioxide: 1098.

MAINE (contd.)

Oxford County (contd.)
Thorium Occurrences
Rumford
Black Mountain quarries: autunite, beryl, columbite-tantalite, cyrtolite, uraninite, uranophane, zircon among rare and accessory minerals in pegmatite; geology, description: 690.
Rumford mica mine on NW side of Black Mountain: hydrothermal minerals in the pegmatite include abundant autunite, uraninite, cyrtolite imbedded in feldspar and associated with uraninite and manganese oxide, uranophane as a crust on feldspar; uraninite occurs as minute crystals and on cleavelandite and shows some alteration to gummite, autunite, uranophane, and other secondary uraninites: 1002.
Stoneham: allanite:858.
Torbernite Occurrences
Albany
Guy Johnson mine: autunite, beryl, torbernite among rare and accessory minerals in pegmatite; geology, description: 690.
Wardwell No. 1 mine: autunite, beryl, torbernite, questionable occurrence of uraninite, among rare and accessory minerals in pegmatite; geology, description: 690.
Newry: autunite, gummite, hatchettolite, torbernite, microlite, uraninite: 858; Quarry at: autunite, gummite, hatchettolite in minute crystals, microlite, pyrochlore, torbernite, uraninite in very small crystals and masses, uranophane: 783.

MAINE (contd.)

Oxford County (contd.)
Torbernite Occurrences
Newry
Newry Hill
Dunton pegmatite: this pegmatite was mined at various times for gem tourmaline, pollucite, and for feldspar; it has six zones and is an irregularly shaped lens about 190 ft. long and 10 ft. thick; among minerals reported in it are autunite, gummite, hatchettolite or uranium pyrochlore, microlite, torbernite, uraninite and uranophane: 1111.
Main pegmatite: this is the largest pegmatite body in the area and is a gently dipping tabular lens 2,450 ft. long and inferred to be about 100 ft. thick; many small prospect pits have been made in this pegmatite but the only sizeable workings are at the Nevel mine; this pegmatite has seven zones, many fracture-controlled replacement units of medium to small size, and one large replacement body; among the minerals reported from this pegmatite are autunite, torbernite, and uraninite: 1111.
Nevel mine: one of the prospects being worked in the Main pegmatite; autunite, torbernite, and uraninite have been reported here: 1111; autunite, cyrtolite, gummite, microlite, torbernite: 858.

MAINE (contd.)

Oxford County (contd.)
Torbernite Occurrences
Newry
Newry Hill
Nevel mine: pegmatite formerly worked for pollucite and spodumene but work ceased in 1929; mine is one of best localities in state for collecting rare minerals which include: autunite, gummite, torbernite, uranopilite: 984.
Peru: torbernite: 858.
Rumford: autunite, microlite, torbernite: 858.
Black Mountain: autunite, microlite, torbernite (rare), uranopilite: 858.
Uraninite Occurrences
Albany
Ernest Wentworth mine in pegmatite 2 mi. W of Hutchinson Pond: pegmatite occurrences numerous in area, as are small prospect pits, and examination with Geiger counter gave readings too high to be recorded on the most sensitive scale in areas where black mineral crystals, uraninite (?), were found in stained perthite masses, some in the core-margin zone and others in large loose pegmatite blocks on the pit floor: 887.
Donahue prospect: pegmatite examined with Geiger counter gave readings either more than twice the background count or too high to be recorded on the most sensitive scale at places where black minerals, uraninite (?), were found surrounded by smoky quartz or perthite stained a dark color, this color fading out gradually away from the black mineral; some uraninite (?) crystals were discovered within two feet of the granite wall rock, apparently in the wall zone: 887.
Guy Johnson mine: autunite, beryl, torbernite among rare and accessory minerals in pegmatite; geology, description: 690.

MAINE (contd.)

Oxford County (contd.)
Uraninite Occurrences
Albany
Stearns Mountain mine: pegmatite examined with Geiger counter gave readings either more than twice the background count or too high to be recorded on the most sensitive scale at places where black minerals, uraninite (?), were found surrounded by smoky quartz or perthite stained a dark color, this color fading out gradually away from the black mineral; the minerals are associated with the core-margin zone here: 887.
Wardwell No. 1 mine: autunite, beryl, torbernite among rare and accessory minerals in pegmatite; geology, description, questionable occurrence of uraninite: 690.
Greenwood
Harvard quarry on W slope of Noyes Mountain: beryl, columbite-tantalite, gummite, hatchettolite, samarskite, uraninite, zircon among rare and accessory minerals in pegmatite; geology, description: 690.
Hibbs mine in Hebron: pegmatite examined with Geiger counter gave readings either more than twice the background count or too high to be recorded on the most sensitive scale, at places where black minerals, uraninite (?), were found surrounded by smoky quartz or perthite stained a dark color, this color fading out gradually away from the black minerals: 887.
Newry: autunite, gummite, hatchettolite, torbernite, microlite, uraninite: 858.

MAINE (contd.)

Oxford County (contd.)
Uraninite Occurrences
Newry, Quarry at: autunite, gummite, hatchettolite in minute crystals, microlite, pyrochlore, torbernite, uraninite in very small crystals and masses, uranophane: 783.
Newry Hill (formerly Hall's Ridge): Dunton pegmatite at Plumbago Mountain contained a few grains of uraninite mostly altered to gummite and uranophane, and some grey beryl and beryllonite: 1100.
Dunton pegmatite: this pegmatite was mined at various times for gem tourmaline, pollucite, and for feldspar; it has six zones and is an irregularly shaped lens about 190 ft. long and 10 ft. thick; among minerals reported in it are autunite, gummite, hachettolite or uranium pyrochlore, microlite, torbernite, uraninite, and uranophane: 1111.
Main pegmatite: this is the largest pegmatite body in the area and is a gently dipping tabular lens 2,450 ft. long and inferred to be about 100 ft. thick; many small prospect pits have been made in this pegmatite but the only sizeable workings are at the Nevel mine; this pegmatite has seven zones, many fracture-controlled replacement units of medium to small size, and one large replacement body; among the minerals reported from this pegmatite are autunite, torbernite, and uraninite: 1111.
Nevel mine: one of the prospects being worked in the Main pegmatite; autunite, torbernite, and uraninite have been reported here: 1111; uraninite in new pit: 1053.

MAINE (contd.)

Oxford County (contd.)
Uraninite Occurrences
Newry
Newry mine: autunite in minute crystals, hatchettolite, microlite in small crystals, uraninite: 998; pegmatite examined with Geiger counter gave readings either more than twice the background count or too high to be recorded on the most sensitive scale, at places where black minerals, uraninite (?), were found surrounded by smoky quartz or perthite stained a dark color, this color fading out gradually away from the black mineral; the minerals are probably associated with the core-margin zone here: 887; autunite, beryl, columbite-tantalite, gummite, hatchettolite, uraninite, zircon among rare and accessory minerals in pegmatite; geology, description: 690.
Rumford: Red Hill pegmatites examined with Geiger counter showed an average of 1.5 to 2.0 times the background count exclusive of 7 readings which were too high to be recorded on the most sensitive scale; certain portions, showing greater radioactivity, contain a small black mineral grain, uraninite (?), surrounded by smoky quartz and/or stained, discolored feldspar, such grains seeming to be confined to the wall-zones and core-margin zones: 887.

MAINE (contd.)

Oxford County (contd.)
Uraninite Occurrences
Rumford
Black Mountain: uraninite in pegmatite minerals, as minute crystals in or on cleavelandite in form of a dendritic growth; some uraninite altered to gummite, autunite, uranophane, and other secondary uranium minerals; cyrtolite present as small, well-formed crystals embedded in feldspar and associated with uraninite and manganese dioxide: 1098.
Black Mountain mine 5 mi. NNW of Rumford: pegmatites examined with Geiger counter gave high readings on stained surfaces along joints cutting various parts of the pegmatite; readings on the stained surfaces varied from too high to be recorded on the most sensitive scale of the counter, to considerably above the background count or just the normal pegmatite count; these stained sufaces typically were shiny blue-black and iridescent but some were dull and had a black sooty coating; counts on large perthite crystals were double the background count while those for quartz crystals about equalled the background count: 887.
Black Mountain quarries: autunite, beryl, columbite-tantalite, cyrtolite, uraninite, uranophane, zircon among rare and accessory minerals in pegmatite; geology, description: 690.

MAINE (contd.)

Oxford County (contd.)
Uraninite Occurrences
Rumford
Mount Mica near Paris: several uraninite (?) crystals were found in loose blocks of pegmatite on the dump and two others were located in the wall zone within 1½ ft. of the contact; readings on Geiger counter were either double the background count or too high to be recorded and the mineral was associated with smoky quartz or perthite stained a dark color: 887.
Rumford mica mine on NW side of Black Mountain: hydrothermal minerals in the pegmatite include abundant autunite, uraninite, cyrtolite imbedded in feldspar and associated with uraninite and manganese oxide, uranophane as a crust on feldspar; uraninite occurs as minute crystals and on cleavelandite and shows some alteration to gummite, autunite, uranophane, and other secondary uraninites: 1002.

MAINE (contd.)

Oxford County (contd.)

Uraninite Occurrences

Stoneham

Melrose quarry 5½ mi. WNW of East Stoneham on SE slope of Sugarloaf Mountain: pegmatite examined with Geiger counter gave normal readings for pegmatites except in certain portions where small black mineral grains, uraninite (?), were associated with smoky quartz and gave too high a reading to be recorded on the most sensitive scale; one sulphide vein, exposed for a length of 7 ft. and having a maximum width of 1 ft., cut the pegmatite at one place and consistently gave readings too high to be recorded by the counter, but an analysis of a one lb. sample of the material by U.S.G.S. reported its uranium content to be only 0.09% eU: 887.

Woolwich

Trott Cove mine: pegmatite examined with Geiger counter gave readings either more than twice the background count or too high to be recorded on the most sensitive scale, at places where black minerals, uraninite (?), were found surrounded by smoky quartz or perthite stained a dark color, this color fading out gradually away from the black mineral: 887.

Uranite Occurrences

Hamdon Hill near Stoneham: uranite as minute scales on cleavelandite in coarse granite hill: 822.

Uranium Exploration

Albany

Bumpus mine: pegmatite examined with Geiger counter gave few readings equal to twice the background count and most of these were associated with large masses of perthite; much of this mine was inaccessible because of water conditions: 887.

MAINE (contd.)

Oxford County (contd.)

Uranium Exploration

Albany

Donahue prospect: pegmatite examined with Geiger counter gave readings either more than twice the background count or too high to be recorded on the most sensitive scale at places where black minerals, uraninite (?), were found surrounded by smoky quartz or perthite stained a dark color, this color fading out gradually away from the black mineral; some uraninite (?) crystals were discovered within two feet of the granite wall rock, apparently in the wall zone: 887.

Ernest Wentworth mine in pegmatite 2 mi. W of Hutchinson Pond: pegmatite occurrences numerous in area, as are small prospect pits, and examination with Geiger counter gave readings too high to be recorded on the most sensitive scale in areas where black mineral crystals, uraninite (?), were found in stained perthite masses, some in the core-margin zone and others in large loose pegmatite blocks on the pit floor: 887.

Fred Scribner mine: pegmatite examined with Geiger counter gave readings of more than twice the background count but no specimens of uraninite were seen: 887.

Guy Johnson prospect: pegmatite examined with Geiger counter; no report of readings given: 887.

MAINE (contd.)

Oxford County (contd.)
Uranium Exploration
Albany
Stearns Mountain mine: pegmatite examined with Geiger counter gave readings either more than twice the background count or too high to be recorded on the most sensitive scale at places where black minerals, uraninite (?), were found surrounded by smoky quartz or perthite stained a dark color, this color fading out gradually away from the black mineral; the minerals are associated with the core-margin zone here: 887.
Wardwell mine: pegmatite examined with Geiger counter, the highest readings were equal to 2 or 2½ times the background count, the majority of these being located along contacts of pegmatite with wall rock or along the margins of inclusions of gneiss in pegmatite: 887.
Beech Hill mine at Waterford: pegmatite examined with Geiger counter gave only four readings more than twice the background count and of these three were located at the contact with the wall rock; no uraninite specimens were seen: 887.
Greenwood
Noyes Mountain, abandoned mica-gem quarry on S slope of, 4 mi. SW of West Paris: pegmatite examined with Geiger counter gave readings mostly less than twice the background count except in certain parts which contained abundant garnet and black tourmaline and gave consistently high readings, some too high to be recorded on the most sensitive scale of the counter: 887.

MAINE (contd.)

Oxford County (contd.)
Uranium Exploration
Greenwood
Nubble mica mine about 4 mi. SW of West Paris: pegmatite examined with Geiger counter gave normal reading for pegmatites except in two veinlike zones containing abundant biotite mica and garnet and some smoky quartz and muscovite mica, which were traced along the strike of the pegmatite and gave consistently high readings throughout their extent averaging more than 2½ times the background count: 887.
Hibbs mine in Hebron: pegmatite examined with Geiger counter gave readings either more than twice the background count or too high to be recorded on the most sensitive scale, at places where black minerals, uraninite (?), were found surrounded by smoky quartz or perthite stained a dark color, this color fading out gradually away from the black minerals: 887.
John Lobiskis mine at West Peru: pegmatite examined with Geiger counter gave few readings equal to twice the background count and most of these were associated with large masses of perthite: 887.
Newry
Newry mine: pegmatite examined with Geiger counter gave readings either more than twice the background count or too high to be recorded on the most sensitive scale, at places where black minerals, uraninite (?), were found surrounded by smoky quartz

MAINE (contd.)

Oxford County (contd.)
Uranium Exploration
Newry
Newry mine:
or perthite stained a dark color, this color fading out gradually away from the black mineral; the minerals are probably associated with the core-margin zone here: 887.
Reynolds mine at Canton: pegmatite examined with Geiger counter gave few readings equal to twice the background count and most of these were associated with large masses of perthite: 887.
Rumford: Red Hill pegmatites examined with Geiger counter showed an average of 1.5 to 2.0 times the background count exclusive of 7 readings which were too high to be recorded on the most sensitive scale: certain portions, showing greater radioactivity, contain a small black mineral grain, uraninite (?), surrounded by smoky quartz and/or stained, discolored feldspar, such grains seeming to be confined to the wall-zones and core-margin zones: 887.
Black Mountain mine 5 mi. NNW of Rumford: pegmatites examined with Geiger counter gave high readings on stained surfaces along joints cutting various parts of the pegmatite; readings on the stained surfaces varied from too high to be recorded on the most sensitive scale of the counter, to considerably above the background count or just the normal pegmatite count; these stained surfaces typically were shiny blue-black and iridescent but some were dull and had a black sooty coating; counts on large perthite crystals were double the background count while those for quartz crystals about equalled the background count: 887.

MAINE (contd.)

Oxford County (contd.)
Uranium Exploration
Rumford area
George Elliot mine: pegmatite examined with Geiger counter gave readings of more than twice the background count but no uraninite specimens were seen; the schist inclusions and wall rock contacts gave readings of three times the background count in some places but were low in others: 887.
Mount Mica near Paris: several uraninite (?) crystals were found in loose blocks of pegmatite on the dump and two others were located in the wall zone within 1½ ft. of the contact; readings on Geiger counter were either double the background count or were too high to be recorded and the mineral was associated with smoky quartz or perthite stained a dark color: 887.
Stoneham
Foster Hill mine: pegmatite examined with Geiger counter gave few readings equal to twice the background count and most of these were associated with large masses of perthite: 887.
Melrose quarry 5½ mi. WNW of East Stoneham on SE slope of Sugarloaf Mountain: pegmatite examined with Geiger counter gave normal readings for pegmatites except in certain portions where small black mineral grains, uraninite (?), were associated with smoky quartz and gave too high a reading to be recorded on the most sensitive scale; one sulphide vein, exposed for a length of 7 ft. and having a maximum width of 1 ft.,

MAINE (contd.)

Oxford County (contd.)
Uranium Exploration
Stoneham
Melrose quarry 5½ mi. WNW of East Stoneham on SE slope of Sugarloaf Mountain:
cut the pegmatite at one place and consistently gave readings too high to be recorded by the counter, but an analysis of a one lb. sample of the material by U.S.G.S. reported its uranium content to be only 0.09% eU: 887.
Woolwich
Trott Cove mine: pegmatite examined with a Geiger counter gave readings either more than twice the background count or too high to be recorded on the most sensitive scale, at places where black minerals, uraninite (?), were found surrounded by smoky quartz or perthite stained a dark color, this color fading out gradually away from the black mineral: 887.
Uranium Occurrences
Albany
Donahue prospect: pegmatite examined with Geiger counter gave readings either more than twice the background count or too high to be recorded on the most sensitive scale at places where black minerals, uraninite (?), were found surrounded by smoky quartz or perthite stained a dark color, this color fading out gradually away from the black mineral; some uraninite (?) crystals were discovered within two feet of the granite wall rock, apparantly in the wall zone: 887.
Ernest Wentworth mine in pegmatite 2 mi. W of Hutchinson Pond: pegmatite occurrences numerous in area, as are small prospect pits, and examination with Geiger counter gave readings too high to be recorded on the most sensitive scale in areas where

MAINE (contd.)

Oxford County (contd.)
Uranium Occurrences
Albany area
Ernest Wentworth mine in pegmatite 2 mi. W of Hutchinson Pond:
black mineral crystals, uraninite (?), were found in stained perthite masses, some in the core-margin zone and others in large loose pegmatite blocks on the pit floor: 887.
Guy Johnson mine: autunite, beryl, torbernite, among rare and accessory minerals in pegmatite; geology, description: 690.
Stearns Mountain mine: pegmatite examined with Geiger counter gave readings either more than twice the background count or too high to be recorded on the most sensitive scale at places where black minerals, uraninite (?), were found surrounded by smoky quartz or perthite stained a dark color, this color fading out gradually away from the black mineral; the minerals are associated with the core-margin zone here: 887.
Wardwell No. 1 mine: autunite, beryl, torbernite, questionable occurrence of uraninite, among rare and accessory minerals in pegmatite; geology, description: 690.
Wardwell quarry: autunite: 1019.
Buckfield
Bennett feldspar quarry: autunite, columbite-tantalite, cookeite, hatchettolite among rare and accessory minerals in pegmatite; geology, description: 690.

MAINE (contd.)

Oxford County (contd.)
Uranium Occurrences
Greenwood: pyrochlore occurs in albite associated with zircon crystals and is rare: 988.
Harvard quarry on W slope of Noyes Mountain: beryl, columbite-tantalite, gummite, hatchettolite, samarskite, uraninite, zircon among rare and accessory minerals in pegmatite; geology, description: 690.
Witt Hill: autunite specks in solid rock; chrysoberyl, garnet, spinel, and zircon also present: 848.
Hibbs mine in Hebron: pegmatite examined with Geiger counter gave readings either more than twice the background count or too high to be recorded on the most sensitive scale, at places where black minerals, uraninite (?), were found surrounded by smoky quartz or perthite stained a dark color, this color fading out gradually away from the black minerals: 887.
Hooper's Ledge feldspar quarry, abandoned, NE of South Paris and S of Mt. Mica: autunite in pegmatite, with dark smoky quartz: 962.
Lord Hill near Kezar Lake: autunite among minerals in feldspar quarry no longer being worked: 931.
Newry: autunite, gummite, hatchettolite, microlite, torbernite, and uraninite: 858; microlite among minerals in group of four pegmatites described as to origin, structure, and mineralogy: 945; in feldspar quarries, small brown crystals of zircon with autunite, albite, columbite, and smoky quartz: 1070; in quarry, autunite, gummite, hatchettolite in minute crystals, microlite, pyrochlore, torbernite, uraninite in very small crystals and masses, uranophane: 783.

MAINE (contd.)

Oxford County (contd.)
Uranium Occurrences
Newry
Dunton tourmaline deposit: microlite in cleavelandite, columbite, pitchblende largely altered to gummite and autunite crusts: 756.
Dunton tourmaline mine: pegmatite sill-like mass contains beryl, columbite, and autunite as minor constituents: 655.
Newry Hill (formerly Hall's Ridge): autunite: 858; Dunton pegmatite in Plumbago Mountain contained a few grains of uraninite mostly altered to gummite and uranophane, and some grey beryl and beryllonite: 1100.
Main pegmatite: this is the largest pegmatite body in the area and is a gently dipping tabular lens 2,450 ft. long and inferred to be about 100 ft. thick; many small prospect pits have been made in this pegmatite but the only sizeable workings are at the Nevel mine; this pegmatite has seven zones, many fracture-controlled replacement units of medium to small size, and one large replacement body; among the minerals reported from this pegmatite are autunite, torbernite, and uraninite: 1111.

MAINE (contd.)

Oxford County (contd.)
Uranium Occurrences
Newry
Newry Hill
Dunton pegmatite: this pegmatite was mined at various times for gem tourmaline, pollucite, and for feldspar; it has six zones and is an irregularly shaped lens about 190 ft. long and 10 ft. thick; among minerals reported in it are autunite, gummite, hachettolite or uranium pyrochlore, microlite, torbernite, uraninite and uranophane: 1111.
Nevel mine: one of the prospects being worked in the Main pegmatite; autunite, torbernite, and uraninite have been reported here: 1111; autunite in pegmatite: 962; autunite, cyrtolite, gummite, microlite, torbernite: 858; uraninite in new pit: 1053; pegmatite formerly worked for pollucite and spodumene but work ceased in 1929; mine is one of best localities in state for collecting rare minerals which include: autunite, gummite, torbernite, uranopilite: 984.
Newry mine: autunite in minute crystals, hatchettolite, microlite in small crystals, and uraninite: 998; pegmatite examined with Geiger counter gave readings either more than twice the background count or too high to be recorded on the most sensitive scale, at places where black minerals, uraninite (?), were found surrounded by smoky quartz or perthite stained a dark color, this color fading out gradually away from the black mineral; the minerals are probably associated with the core-margin zone here: 887.

MAINE (contd.)

Oxford County (contd.)
Uranium Occurrences
Newry
Newry mines: autunite, beryl, columbite-tantalite, gummite, hatchettolite, uraninite, zircon among rare and accessory minerals in pegmatite; geology, description: 690.
Paris: yttrocerite: 858.
Mt. Mica: autunite in pegmatite: 962; autunite, yttrocerite, and zircon among many minerals present here in gem-bearing pegmatite: 655.
Mt. Mica mine: autunite, yttrocerite, gem minerals: 795
Paris-Rumford area: questionable occurrence since unidentified, yellow, platy mineral forms crust on fracture walls, resembles autunite, and is one of latest minerals in Lord Hill pegmatites: 1024.
Peru: torbernite: 858.
Rumford: autunite, columbite, microlite: 638; autunite, microlite, and torbernite: 858; Red Hill pegmatites examined with Geiger counter showed an average of 1.5 to 2.0 times the background count exclusive of 7 readings which were too high to be recorded on the most sensitive scale; certain portions, showing greater radioactivity, contain a small black mineral grain, uraninite (?), surrounded by smoky quartz and/or stained, discolored feldspar, such grains seeming to be confined to the wall-zones and core-margin zones: 887.

MAINE (contd.)

Oxford County (contd.)
Uranium Occurrences
Rumford
Black Mountain: autunite in pegmatite: 962; autunite, columbite associated with tourmaline deposit in pegmatite: 639; autunite, microlite, torbernite (rare), uranopilite: 858; microlite in pegmatite ledge; microlite, mineralogical description, quantitative chemical analysis made but results not listed: 752; uraninite in pegmatite minerals, as minute crystals in or on cleavelandite in form of a dendritic growth; some uraninite altered to gummite, autunite, uranophane, and other secondary uranium minerals; cyrtolite present as small, well-formed crystals embedded in feldspar and associated with uraninite and manganese dioxide: 1098.
Black Mountain mine 5 mi. NNW of Rumford: pegmatites examined with Geiger counter gave high readings on stained surfaces along joints cutting various parts of the pegmatite; readings on the stained surfaces varied from too high to be recorded on the most sensitive scale of the counter, to considerably above the background count or just the normal pegmatite count; these stained surfaces typically were shiny blue-black and iridescent but some were dull and had a black sooty coating; counts on large perthite crystals were double the background count while those for quartz crystals about equalled the background count: 887.
Black Mountain quarries: autunite, beryl, columbite-tantalite, cyrtolite, uraninite, uranophane, zircon among rare and accessory minerals in pegmatite; geology, description: 690.

MAINE (contd.)

Oxford County (contd.)
Uranium Occurrences
Rumford
Mount Mica near Paris: several uraninite (?) crystals were found in loose blocks of pegmatite on the dump and two others were located in the wall zone within 1½ ft. of the contact; readings on Geiger counter were either double the background count or too high to be recorded and the mineral was associated with smoky quartz or perthite stained a dark color: 887.
Rumford mica mine on NW side of Black Mountain: hydrothermal minerals in the pegmatite include abundant autunite, uraninite, cyrtolite imbedded in feldspar and associated with uraninite and manganese oxide, uranophane as a crust on feldspar; uraninite occurs as minute crystals and on cleavelandite and shows some alteration to gummite, autunite, uranophane, and other secondary uraninites: 1002.
Stoneham
Hamdon Hill: uranite as minute scales on cleavelandite in coarse granite hill: 822.
Harndon Hill: autunite in pegmatite: 962; autunite among minerals present in pegmatite: 655.
Melrose quarry 5½ mi. WNW of East Stoneham on SE slope of Sugarloaf Mountain: pegmatite examined with Geiger counter gave normal readings for pegmatites except in certain portions where small black mineral grains, uraninite (?), were associated with smoky quartz and gave too high a reading to

MAINE (contd.)

Oxford County (contd.)
Uranium Occurrences
Stoneham
Melrose quarry:
be recorded on the most sensitive scale; one sulphide vein, exposed for a length of 7 ft. and having a maximum width of 1 ft., cut the pegmatite at one place and consistently gave readings too high to be recorded by the counter, but an analysis of a one lb. sample of the material by U.S.G.S. reported its uranium content to be only 0.09% eU: 887.
Woolwich
Trott Cove mine: pegmatite examined with Geiger counter gave readings either more than twice the background count or too high to be recorded on the most sensitive scale, at places where black minerals, uraninite (?), were found surrounded by smoky quartz or perthite stained a dark color, this color fading out gradually away from the black mineral: 887.
Uranophane Occurrences
Newry, Quarry at: autunite, gummite, hatchettolite in minute crystals, microlite, pyrochlore, torbernite, uraninite in very small crystals and masses, uranophane: 783.
Newry Hill (formerly Halls' Ridge)
Dunton pegmatite: at Plumbago Mountain, this pegmatite contained a few grains of uraninite mostly altered to gummite, and uranophane, and some grey beryl and beryllonite: 1100; this pegmatite was mined at various times for gem tourmaline, pollucite, and for feldspar; it has six zones and is an irregularly shaped lens about 190 ft. long and 10 ft. thick; among minerals reported in it are autunite, gummite, hatchettolite or uranium pyrochlore, microlite, torbernite, uraninite, and uranophane: 1111.

MAINE (contd.)

Oxford County (contd.)
Uranophane Occurrences
Rumford
Black Mountain: uraninite in pegmatite minerals, as minute crystals in or on cleavelandite in form of a dendritic growth; some uraninite altered to gummite, autunite, uranophane, and other secondary uranium minerals, cyrtolite present as small, well-formed crystals embedded in feldspar and associated with uraninite and manganese dioxide: 1098.
Black Mountain quarries: autunite, beryl, columbite-tantalite, cyrtolite, uraninite, uranophane, zircon among rare and accessory minerals in pegmatite: geology: 690
Rumford mica mine on NW side of Black Mountain: hydrothermal minerals in the pegmatite include abundant autunite, uraninite, cyrtolite imbedded in feldspar and associated with uraninite and manganese oxide, uranophane as a crust on feldspar; uraninite occurs as minute crystals and on cleavelandite and shows some alteration to gummite, autunite, uranophane, and other secondary uraninites: 1002.
Uranopilite Occurrences
Newry
Newry Hill
Nevel mine: pegmatite formerly worked for pollucite and spodumene but work ceased in 1929; mine is one of best localities in state for collecting rare minerals which include: autunite, gummite, torbernite, uranopilite: 984.
Rumford
Black Mountain: autunite, microlite, torbernite (rare), uranopilite: 858.

MAINE (contd.)

Oxford County (contd.)
Yttrocerite Occurrences
Paris: yttrocerite: 858.
Mt. Mica mine: autunite, yttrocerite, gem minerals: 795.

Piscataquis County
Radioactive Occurrences
Katahdin Iron Works: radioactivity determinations on massive pyrrhotite body in gabbro capped by limonitic gossan were negative: 843.
Radioactive Rocks
Camp Phoenix, at 4.4 mi. SE of, on Baxter State Park road, and at 2.3 mi. SE of, on unnumbered dirt road to Baxter State Park: radioactivity of massive granite in Precambrian to Upper Paleozoic granite, estimated as 0.003% eU: 877.
Chesuncook Lake: radioactivity of greenstone tuff matrix sample: field analysis, 0.004% eU; laboratory analysis, 0.003% eU, 0.001% U; radioactivity of quartzite pebbles: field analysis, 0.001% eU; laboratory analysis, 0.001% eU, 0.000% U: 877.
Chesuncook Lake, about 0.1 mi. SW of Ripogenus Dam, on unnumbered dirt road: radioactivity of quartzite conglomerate with greenstone matrix in Silurian to Devonian diabase schist and greenstone, estimated as 0.001% eU for quartzite and 0.004% eU for greenstone: 877.
Harrington Lake
A area: radioactivity of black phyllite sample: field analysis, 0.003% eU; laboratory analysis, 0.003% eU, no figure for U: 877.
B area: radioactivity of massive granite sample: field analysis, 0.003% eU; laboratory analysis, 0.003% eU, 0.000% U: 877.
C area: radioactivity of massive granite sample: field analysis, 0.003% eU; laboratory analysis, 0.003% eU, 0.000% U: 877.

MAINE (contd.)

Piscataquis County (contd.)
Radioactive Rocks
Harrington Lake, near W end, 7.5 mi. W of Camp Phoenix on unnumbered dirt road to Baxter State Park: radioactivity of Silurian phyllite, estimated as 0.003% eU: 877.
Kokadjo: radioactivity of black phyllite sample: field analysis, 0.003% eU; laboratory analysis, 0.002% eU, 0.000% U: 877.
Kokadjo, 5.3 mi. N of, on unnumbered dirt road: radioactivity of black phyllite in Silurian schist, estimated as 0.003% eU: 877.
Monson: radioactivity of black phyllite sample: field analysis, 0.003% eU; laboratory analysis, 0.003% eU, 0.000% U: 877.
Monson, 15 mi. N of, on Maine Highway 15: radioactivity of phyllite in Silurian slate and phyllite, estimated as 0.003% eU: 877.
Yoke Pond: radioactivity of granite sample: field analysis, 0.003% eU; laboratory analysis, 0.003% eU, 0.000% U: 877.
Yoke Pond, 2.2 mi. W of, on unnumbered dirt road E of Kokadjo: radioactivity of gray granite in Precambrian to Upper Paleozoic granite, estimated as 0.003% eU: 877.
Uranium Occurrences
Chesuncook Lake: radioactivity of greenstone tuff matrix sample: field analysis, 0.004% eU; laboratory analysis, 0.003% eU, 0.001% U; radioactivity of quartzite pebbles: field analysis, 0.001% eU; laboratory analysis, 0.001% eU, 0.000% U: 877.

MAINE (contd.)

Pitchblende Occurrences
See under individual county names and under Index III, Pitchblende Occurrences-Maine: 756.

Prospectors' Guides
See under individual county names and under Index III, Prospectors' Guides-Maine: 1101.

Pyrochlore Occurrences
See under individual county names and under Index III, Pyrochlore Occ.-Maine: 783, 883, 988, 1111.

Radioactive Minerals
See under individual county names and under Index III, Radioactive Minerals-Maine: 984.

Radioactive Occurrences
See under individual county names and under Index III, Radioactive Occurrences-Maine:843.

Radioactive Rocks
See under individual county names and under Index III, Radioactive Rocks-Maine:745, 746, 803, 827, 877, 887, 898, 1039.

Sagadahoc County
Age Determinations
Topsham: analysis of monazite for age determinations gave 6.70% ThO_2 or 5.89% Th, no U, age ratio 0.079: 1038; analysis of samarskite for age determinations gave 17.20% UO_3, 14.10% rare earths, 3.03% ThO_2, age about 232 m.y. or Carboniferous: 1037.
Allanite Occurrences
Topsham: allanite, autunite: 858; allanite in granite ledge; found to be "appreciabl, radioactive" when tested with electroscope: 900.
Sprague's granite quarry: allanite present; chemical analysis showed no Th but the Ce group was not broken down: 703.

MAINE (contd.)

Sagadahoc County (contd.)
Allanite Occurrences
Topsham
Sprague's Hill: allanite in granite, mostly as brownish decomposed crystals; chemical analysis lists no uranium or thorium content but adds up to 99.97: 923.
Autunite Occurrences
Georgetown
Consolidated (Golding's) quarry: autunite, beryl, gummite, among rare and accessory minerals in pegmatite; geology, description: 690.
Topsham: allanite, autunite: 858; autunite in pegmatite: 962; autunite as small greenish scales on pegmatite: 1055; autunite as greenish scales on pegmatite: 1056.
Standpipe Hill: pegmatite, as an intrusion in quartz-mica schist, containing autunite as platy yellow crystalline flakes on surfaces and in seams in feldspar; monazite as small sharp twinned crystals, dark brown, lustrous, and comparatively abundant occurring in microcline at the contact between the biotite and feldspar; small crystals of samarskite in triangular-shaped masses of feldspar, which becomes somewhat chalk-like and loses one degree of hardness where it surrounds monazite and samarskite: 1026.
Gummite Occurrences
Geofgetown
Consolidated (Golding's) quarry: autunite, beryl, gummite, among rare and accessory minerals in pegmatite; geology, description: 690.

MAINE (contd.)

Sagadahoc County (contd.)

Microlite Occurrences

Topsham: microlite, in a topaz pegmatite, occurs enclosed in albite, embedded in topaz crystals, enclosed in lepidolite crystals, implanted on tourmaline needles, as sharp crystals at boundary between quartz and lepidolite, and encrusted with stibiotantalite crystals or coated with sericite: 891; microlite here ranges in color from grass to emerald green, first time this color has been reported for it: 891; mineralogy: 891; microlite, chemical analysis listed 0.54% UO_3: 891; microlite, monazite, and samarskite reported in pegmatites; last two minerals analyzed by earlier writer; age determinations for pegmatite from these analyses were Carboniferous from samarskite analyses and Proterozoic from monazite analysis; geology and description of general pegmatite area: 938.

Monazite Occurrences

Topsham: microlite, monazite, and samarskite reported in pegmatites; last two minerals analyzed by earlier writers; age determinations for pegmatite from these analyses were Carboniferous from samarskite analysis and Proterozoic from monazite analysis; geology and description of general pegmatite area: 938; analysis of monazite for age determinations gave 6.70% ThO_2 or 5.89% Th, no U, age ratio 0.079: 1038; chemical analysis of monazite gave 5.89% Th and an age of 630 m.y.: 925; monazite, average Pb/U ratio 0.79 and geologic age 574 (?) m.y.; samarskite, average Pb/U ratio 0.031 and geologic age 232 m.y.: 948.

MAINE (contd.)

Sagadahoc County (contd.)

Monazite Occurrences

Topsham

Standpipe Hill: pegmatite, as an intrusion in quartz-mica schist, containing autunite as platy yellow crystalline flakes on surfaces and in seams in feldspar; monazite as small sharp twinned crystals, dark brown, lustrous, and comparatively abundant occurring in microcline at the contact between the biotite and feldspar; small crystals of samarskite in triangular-shaped masses of feldspar, which becomes somewhat chalklike and loses one degree of hardness where it surrounds monazite and samarskite: 1026.

Radioactive Rocks

Topsham

Quarry No. 1: pegmatite examined with Geiger counter gave readings either more than twice the background count or too high to be recorded on the most sensitive scale, at places where black minerals, uraninite (?), were found surrounded by smoky quartz or perthite stained a dark color, this color fading out gradually away from the black mineral; the minerals are probably associated with the core-margin zone here: 887.

Russell Brothers mine: pegmatite examined with Geiger counter gave readings either more than twice the background count or too high to be recorded on the most sensitive scale, at places where black minerals,

MAINE (contd.)

Sagadahoc County (contd.)

Radioactive Rocks

Topsham

Russell Brothers mine: uraninite (?), were found surrounded by smoky quartz or perthite stained a dark color, this color fading out gradually away from the black mineral; the minerals are probably associated with the core-margin zone here: 887.

Trenton quarry: pegmatite examined with Geiger counter; no report of readings given: 887.

Samarskite Occurrences

Topsham: microlite, monazite, and samarskite reported in pegmatites; last two minerals analyzed by earlier writers; age determinations for pegmatite from these analyses were Carboniferous from samarskite analysis and Proterozoic from monazite analysis; geology and description of general pegmatite area: 938; analysis of samarskite for age determinations gave 17.20% UO_3, 14.10% rare earths, 3.03% ThO_2, age about 232 m.y. or Carboniferous: 1037; chemical analysis of samarskite 14.31% U, 2.66% Th, and an age of 220 m.y.: 925; monazite average Pb/U ratio 0.79 and geologic age 574 (?).m.y.; samarskite, average Pb/U ratio 0.031 and geologic age 232 m.y.: 948.

Standpipe Hill: pegmatite, as an intrusion in quartz-mica schist, containing autunite as platy yellow crystalline flakes on surfaces and in seams in feldspar; monazite as small sharp twinned crystals, dark brown, lustrous, and comparatively abundant occurring in microcline at the contact between the biotite and feldspar; small crystals of samarskite in triangular-shaped masses of feldspar, which becomes somewhat chalklike and loses one degree of hardness where it surrounds monazite and samarskite:1026.

MAINE (contd.)

Sagadahoc County (contd.)

Thorium Occurrences

Topsham: allanite in granite ledge; found to be "appreciably radioactive" when tested with electroscope: 900; microlite, monazite, and samarskite reported in pegmatites; last two minerals analyzed by earlier writers; age determinations for pegmatite from these analyses were Carboniferous from samarskite analysis and Proterozoic from monazite analysis; geology and description of general pegmatite area: 938; analysis of monazite for age determinations gave 6.70% ThO_2 or 5.89% Th, no U, age ratio 0.079: 1038; analysis of samarskite for age determinations gave 17.20% UO_3, 14.10% rare earths, 3.03% ThO_2, age about 232 m.y. or Carboniferous: 1037; chemical analysis of monazite gave 5.89% Th and an age of 630 m.y.: 925; chemical analysis of samarskite gave 14.31% U, 2.66% Th, and an age of 220 m.y.: 925; monazite, average Pb/U ratio 0.79 and geologic age 574 (?) m.y.; samarskite, average Pb/U ratio 0.031 and geologic age 232 m.y.: 948.

Sprague's granite quarry: allanite present; chemical analysis showed no Th but the Ce group was not broken down: 703.

Sprague's Hill: allanite in granite, mostly as brownish decomposed crystals; chemical analysis lists no uranium or thorium content but adds up to 99.97: 923.

MAINE (contd.)

Sagadahoc County (contd.)

Thorium Occurrences

Topsham

Standpipe Hill: pegmatite, as an intrusion in quartz-mica schist, containing autunite as platy yellow crystalline flakes on surfaces and in seams in feldspar; monazite as small sharp twinned crystals, dark brown, lustrous, and comparatively abundant occurring in microcline at the contact between the biotite and feldspar; small crystals of samarskite in triangular-shaped masses of feldspar, which becomes somewhat chalklike and loses one degree of hardness where it surrounds monazite and samarskite: 1026.

Torbernite Occurrences

Topsham: torbernite occurs sparingly in apple green plates filling seams and fractures in a blackish cleavelandite muscovite matrix: 687.

Fisher quarry: small amounts of torbernite, columbite among the many minerals found in pegmatite: 889.

Uraninite Occurrences

Topsham

Quarry No. 1: pegmatite examined with Geiger counter gave readings either more than twice the background count or too high to be recorded on the most sensitive scale, at places where black minerals, uraninite (?), were found surrounded by smoky quartz or perthite stained a dark color, this color fading out gradually away from the black mineral; the minerals are probably associated with the core-margin zone here: 887.

MAINE (contd.)

Sagadahoc County (contd.)

Uraninite Occurrences

Topsham

Russell Brothers mine: pegmatite examined with Geiger counter gave readings either more than twice the background count or too high to be recorded on the most sensitive scale, at places where black minerals, uraninite (?), were found surrounded by smoky quartz or perthite stained a dark color, this color fading out gradually away from the black mineral; the minerals are probably associated with the core-margin zone here: 887.

Uranium Exploration

Topsham

Quarry No. 1: pegmatite examined with Geiger counter gave readings either more than twice the background count or too high to be recorded on the most sensitive scale, at places where black minerals, uraninite (?), were found surrounded by smoky quartz or perthite stained a dark color, this color fading out gradually away from the black mineral; the minerals are probably associated with the core-margin zone here: 887.

Russell Brothers mine: pegmatite examined with Geiger counter gave readings either more than twice the background count or too high to be recorded on the most sensitive scale, at places where black minerals, uraninite (?), were found surrounded by smoky quartz or perthite stained a dark color, this color fading

MAINE (contd.)

Sagadahoc County (contd.)
Uranium Exploration
Topsham
Russell Brothers mine: out gradually away from the black mineral; the minerals are probably associated with the core-margin zone here: 887.
Trenton quarry: pegmatite examined with Geiger counter; no report of readings given: 887.
Uranium Occurrences
Georgetown
Consolidated (Golding's) quarry: autunite, beryl, gummite, among rare and accessory minerals in pegmatite; geology, description: 690.
Topsham: allanite, autunite: 858; autunite in pegmatite: 962; autunite as small greenish scales on pegmatite: 1055; autunite as greenish scales on pegmatite: 1056; microlite, monazite, and samarskite reported in pegmatites; last two minerals analyzed by earlier writers; age determinations for pegmatite from these analyses were Carboniferous from samarskite analysis and Proterozoic from monazite analysis; geology and description of general pegmatite area: 938; microlite, in a topaz pegmatite, occurs enclosed in albite, embedded in topaz crystals, enclosed in lepidolite crystals, implanted on tourmaline needles, as sharp crystals at boundary between quartz and lepidolite, and encrusted with stibiotantalite crystals or coated with sericite: 891; microlite, chemical analysis listed 0.54% UO_3: 891; microlite here ranges in color from grass to emerald green, first time this color has been reported for it: 891; mineralogy: 891; monazite, average Pb/U ratio 0.79 and geologic age 574 (?) m.y.; samarskite, average Pb/U ratio 0.031 and geologic age 232 m.y.: 948;

MAINE (contd.)

Sagadahoc County (contd.)
Uranium Occurrences
Topsham:
analysis of samarskite for age determinations gave 17.20% UO_3, 14.10% rare earths, 3.03% ThO_2, age about 232 m.y. or Carboniferous: 1037; chemical analysis of samarskite gave 14.31% U, 2.66% Th, and an age of 220 m.y.: 925; torbernite occurs sparingly in apple green plates filling seams and fractures in a blackish cleavelandite muscovite matrix: 687.
Fisher quarry: small amounts of torbernite, columbite among the many minerals found in pegmatite: 889.
Quarry No. 1: pegmatite examined with Geiger counter gave readings either more than twice the background count or too high to be recorded on the most sensitive scale, at places where black minerals, uraninite (?), were found surrounded by smoky quartz or perthite stained a dark color, this color fading out gradually away from the black mineral; the minerals are probably associated with the core-margin zone here: 887.
Russell Brothers mine: pegmatite examined with Geiger counter gave readings either more than twice the background count or too high to be recorded on the most sensitive scale, at places where black minerals, uraninite (?), were found surrounded by smoky quartz or perthite stained a dark color, this color fading out gradually away from the black mineral; the minerals are probably associated with the core-margin zone here: 887.

MAINE (contd.)

Sagadahoc County (contd.)
Uranium Occurrences
Topsham
Standpipe Hill: pegmatite, as an intrusion in quartz-mica schist, containing autunite as platy yellow crystalline flakes on surfaces and in seams in feldspar; monazite as small sharp twinned crystals, dark brown, lustrous, and comparatively abundant occurring in microcline at the contact between the biotite and feldspar; small crystals of samarskite in triangular shaped mases of feldspar, which becomes somewhat chalklike and loses one degree of hardness where it surrounds monazite and samarskite: 1026.

Samarskite Occurrences
See under individual county names and under Index III, Samarskite-Occurrences-Maine: 690, 925, 938, 948, 1026, 1037.

Somerset County
Radioactive Rocks
Seboomook: radioactivity of gray phyllite sample; field analysis, 0.003%- eU; laboratory analysis, 0.002% eU, 0.001% U: 877.
Seboomook Lake, 14.0 mi. N of, on unnumbered dirt road from Seboomook Lake to Caucomgomoc Lake: radioactivity of phyllite in Ordovician and Silurian schist and phyllite, estimated as 0.003% eU: 877.
Uranium Occurrences
Seboomook: radioactivity of gray phyllite sample; field analysis, 0.003%- eU; laboratory analysis, 0.002% eU, 0.001% U: 877.

(See also Franklin-Kennebec-Somerset Cos.: 984)

MAINE (contd.)

Thorium Occurrences
See under Individual county names and under Index III, Thorium Occurrences-Maine: 104, 638, 655, 674, 690, 692, 703, 726, 752, 756, 783, 787, 795, 800, 803, 858, 877, 883, 900, 923, 925, 938, 948, 984, 988, 998, 1002, 1026, 1037, 1038, 1039, 1053, 1098, 1100, 1111.
Bibliography: 989.

Torbernite Occurrences
See under individual county names and under Index III, Torbernite Occurrences-Maine: 687, 690, 783, 858, 889, 984, 1111.

Uraninite Occurrences
See under individual county names and under Index III, Uraninite Occurrences-Maine: 690, 783, 858, 887, 998, 1002, 1053, 1098, 1100, 1111.

Uranite Occurrences
See under individual county names and under Index III, Uranite Occurrences-Maine: 822.

Uranium Exploration
See under individual county names and under Index III, Uranium Exploration-Maine: 877, 887, 1101.

Uranium Occurrences
See under individual county names and under Index III, Uranium Occurrences-Maine: 405, 638, 639, 655, 687, 690, 745, 752, 756, 783, 795, 800, 822, 848, 858, 877, 883, 887, 889, 891, 925, 931, 938, 945, 948, 962, 984, 988, 998, 1002, 1019, 1024, 1026, 1037, 1053, 1055, 1056, 1070, 1098, 1100, 1111.
Bibliography: 989.
Bibliography of U.S.G.S. Reports: 572, 1004.

MAINE (contd.)

Uranophane Occurrences
See under individual county names and under Index III, Uranophane Occurrences-Maine: 690, 783, 1002, 1098, 1111.

Uranopilite Occurrences
See under individual county names and under Index III, Uranopilite Occurrences-Maine: 858, 984.

Washington County
Allanite Occurrences
Harrington: allanite in granite: 787.
Radioactive Rocks
Cherryfield: radioactivity of pink granite sample: field analysis, 0.004% eU; laboratory analysis, 0.004% eU, 0.000% U: 877.
Maine Highway 182
Cherryfield, 3.4 mi. W of, on highway 182: radioactivity of a porphyritic granite in Precambrian to Upper Paleozoic granite, estimated as 0.003% eU: 877.
Cherryfield, 4.7 mi. W of, on highway 182: radioactivity of Precambrian to Upper Paleozoic granite, estimated as 0.003% eU: 877.
Cherryfield, at 4.7 and 4.0 mi. W of, on highway 182: radioactivity of a porphyritic and a pink granite, respectively, in Precambrian to Upper Paleozoic granite, estimated as 0.004% eU: 877.
Cherryfield, at 6.6 mi. W of, in large boulders, and at 6.2 mi. W of, on highway 182: radioactivity of Precambrian to Upper Paleozoic granite, estimated as 0.004% eU: 877.
Cherryfield, at 13.3 and 11.6 mi. W of, on highway 182: radioactivity of Precambrian to Upper Paleozoic granite, estimated as 0.003% eU: 877.
Cherryfield, 16 mi. W of, on highway 182: radioactivity of coarse porphyritic granite in Precambrian to Upper Paleozoic granite, estimated as 0.003% eU: 877.

MAINE (contd.)

Washington County (contd.)
Radioactive Rocks
Red Beach: radioactivity of red granite sample (two analyses): first, field analysis, 0.004% eU, laboratory analysis, 0.003% eU, 0.000% U; second, field analysis, 0.004% eU; laboratory analysis, 0.004% eU, 0.001% U: 877.
Topsfield: radioactivity of red granite sample: field analysis, 0.005% eU; laboratory analysis, 0.003% eU, 0.001% U: 877.
U.S. Highway 1
Perry, at 13.2, 12.7-12.8, 10.9, 10.7, and 10.5 mi. N of railroad crossing, on highway 1: radioactivity of Precambrian to Upper Paleozoic granite, estimated as 0.003% eU: 877.
Topsfield, 2.3 mi. N of, on highway 1: radioactivity of Precambrian to Upper Paleozoic granite, estimated as 0.003% eU: 877.
Thorium Occurrences
Harrington: allanite in granite: 787.
Uranium Occurrences
Red Beach: radioactivity of red granite sample (two analyses): first, field analysis, 0.004% eU, laboratory analysis, 0.003% eU, 0.000% U; second, field analysis, 0.004% eU; laboratory analysis, 0.004% eU, 0.001% U: 877.
Topsfield: radioactivity of red granite sample: field analysis, 0.005% eU; laboratory analysis, 0.003% eU, 0.001% U: 877.

York County
Allanite Occurrences
Biddeford: allanite in granite: 787.

MAINE (contd.)

York County (contd.)
Radioactive Rocks
Limerick: radioactivity of outcrop of gneiss in Precambrian gneiss and schist, estimated at 0.003% eU: 877.
East Lebanon-Wilton Mills unnumbered highway
East Lebanon, 3.7 mi. N of, on highway: radioactivity of granite in Precambrian to Upper Paleozoic granite, estimated as 0.003% eU: 877.
East Lebanon, 3.9 mi. N of, on highway: radioactivity of porphyry in Precambrian to Upper Paleozoic granite, estimated as 0.003-0.004% eU: 877.
East Lebanon, 4.8 mi. N of, on highway: radioactivity of granite in Precambrian to Upper Paleozoic granite, estimated as 0.003-0.004% eU: 877.
Maine Highway 109
Springvale, 2.3 mi. NW of, on highway 109: radioactivity of granite in Precambrian to Upper Paleozoic granite, estimated as 0.002-0.003% eU: 877.
Springvale, 3.2 mi. NW of, on highway 109: radioactivity of granite in Precambrian to Upper Paleozoic granite, estimated as 0.002-0.003% eU: 877.
Springvale, 5.3 mi. NW of, on highway 109: radioactivity of granite estimated as 0.003% eU: 877.
Springvale: radioactivity of outcrop of granite in Precambrian to Upper Paleozoic granite, estimated as 0.003% eU: 877.
Thorium Occurrences
Biddeford: allanite in granite: 787.

Yttrocerite Occurrences
See under individual county names and Under Index III, Yttrocerite Occurrences-Maine: 795, 858.

MARYLAND

General
Allanite Occurrences
General: allanite, a micro-constituent of pegmatites: 852; rare earths in allanite in pegmatites: 636.
Monazite Occurrences
Coastal Plain: the deposits of Eocene glauconite sand contain zircon, rutile, epidote, staurolite, and monazite among other minerals: 888.
Radioactive Rocks
General: the Clinton formation of Silurian age was examined radiometrically by U.S.G.S. geologists at 31 localities in Maryland, New Jersey, New York, and Pennsylvania, with particular attention to the phosphatic and hematitic parts of the formation; none of the places tested showed abnormal radioactivity or suggested a concentration of radioactive elements in excess of 0.004% eU, which was also the maximum radioactivity of samples tested; no sample contained more than 0.001% eU; no further work planned by U.S.G.S.: 935.
Samarskite Occurrences
General: samarskite, location unnamed: 654.
Thorium Occurrences
General: allanite, a micro-constituent of pegmates: 852; rare earths in allanite in pegmatites: 636; samarskite, location unnamed: 654.
Coastal Plain: the deposits of Eocene glauconite sand contain zircon, rutile, epidote, staurolite, and monazite among other minerals: 888.
Uranium Occurrences
General: samarskite, location unnamed: 654.
Bibliography of U.S.G.S. Reports: 572, 1004.

MARYLAND (contd.)

Allanite Occurrences
See under individual county names and under Index III, Thorium Occurrences-Maryland: 636, 780, 781, 782, 814, 815, 852, 888.

Allegany County
Radioactive Rocks
Bellegrove, 4 mi. E of: radiometric examination in field of Clinton group sandstone and shale, no radioactivity found; no analysis for U or P_2O_5: 935
Cumberland, 4 mi. NW of: radiometric examination in field of Clinton group sandstone, limestone, and shale, no radioactivity found; no analysis for U or P_2O_5: 935.

Autunite Occurrences
See under individual county names and under Index III, Autunite Occurrences-Maryland: 888, 940, 990, 1063.

Baltimore County
Allanite Occurrences
Arundel Gneiss Quarry, ¼ mile north of Harford Road on west bank of Gunpowder River: pegmatite in Baltimore gneiss contained allanite crystals, epidote, beryl, garnet, among other minerals: 888.
Gunpowder River northeast of Baltimore: allanite-epidote intergrowths in granite but less abundant than at Ilchester and Dorseys Run Station: 814.
Ilchester, vicinity of: allanite, epidote, rutile with ilmenite among minerals in gabbro diorite: 888.
Relay: allanite as an accessory mineral in granites intruded into gneiss of Piedmont Plateau area: 815.
Texas: allanite as an accessory mineral in granites intruded into gneiss of Piedmont Plateau area: 815.
Windsor Road: allanite as an accessory mineral in granites intruded into gneiss of Piedmont Plateau area: 815.

MARYLAND (contd.)

Baltimore County (contd.)
Autunite Occurrences
Baltimore
Falls and Clipper Mill Roads: excavations for water tunnel revealed pegmatite with large crystals of microcline, garnets, tourmaline, apatite, and autunite: 888.
Jones Falls at 29th Street bridge: pegmatite dike exposed during excavations for bridge in 1938 contained, among other minerals, autunite, beryl, epidote: 888.
Wright quarry in Wymans Park near bank of Stony Run: pegmatite and hornblende contained autunite, epidote, and beryl among other minerals: 888.
Radioactive Rocks
General: radioactivity of Ilchester granite, 1.935×10^{-12} g. Ra/g. rock and of Woodstock granite, 1.448×10^{-12} g. Ra/g. rock; E. H. Watson believed this indicated a Carboniferous age for these intrusives based on computations by A. C. Lane from F. Bascom: 852.
Samarskite Occurrences
Baltimore
Jones Falls Gneiss Quarries: pegmatite intruded into Baltimore gneiss contains samarskite among its many other minerals: 888.
Thorium Occurrences
Arundel Gneiss Quarry, ¼ mile north of Harford Road on west bank of Gunpowder River: pegmatite in Baltimore gneiss contained allanite crystals, epidote, beryl, garnet, among other minerals: 888.
Baltimore
Jones Falls Gneiss Quarries: pegmatite intruded into Baltimore gneiss contains samarskite among its many other minerals: 888.

MARYLAND (contd.)

Baltimore County (contd.)
Thorium Occurrences
Gunpowder River northeast of Baltimore: allanite-epidote intergrowths in granite but less abundant than at Ilchester and Dorseys Run Station: 814.
Ilchester, vicinity of: allanite, epidote, rutile with ilmenite among minerals in gabbro diorite: 888.
Relay: allanite as an accessory mineral in granites intruded into gneiss of Piedmont Plateau area: 815.
Texas: allanite as an accessory mineral in granites intruded into gneiss of Piedmont Plateau area: 815.
Windsor Road: allanite as an accessory mineral in granites intruded into gneiss of Piedmont Plateau area: 815.
Torbernite Occurrences
Baltimore
Jones Falls: torbernite, probably in pegmatite: 888.
Uranium Occurrences
Baltimore: crystallized and earthy green oxides of uranium: 704, 924; mineral characteristics described: 704.
Falls and Clipper Mill Roads: excavations for water tunnel revealed pegmatite with large crystals of microcline, garnets, tourmaline, apatite, and autunite: 888.
Jones Falls: torbernite, probably in pegmatite: 888.
Jones Falls at 29th Street Bridge: pegmatite dike exposed during excavations for bridge in 1938 contained, among other minerals, autunite, beryl, epidote: 888.
Jones Falls Gneiss Quarries: pegmatite intruded into Baltimore gneiss contains samarskite among its many other minerals: 888.

MARYLAND (contd.)

Baltimore County (contd.)
Uranium Occurrences
Baltimore
Wright quarry in Wymans Park near bank of Stony Run: pegmatite and hornblende contained autunite, epidote, and beryl among other minerals: 888.

(See also Baltimore-Howard Cos.: 1063.)

Baltimore-Howard Counties
Autunite Occurrences
Orange Grove Station in Patapsco State Park: autunite on museum sample of orthoclase: 1063.
Uranium Occurrences
Orange Grove Station in Patapsco State Park: autunite on museum sample of orthoclase: 1063.

Bibliographies
Uranium Occurrences
Bibliography of U.S.G.S. Reports: 572, 1004.

Carroll County
Allanite Occurrences
Sykesville: allanite as an accessory mineral in granites intruded into gneiss of Piedmont Plateau area: 815.
Thorium Occurrences
Sykesville: allanite as an accessory mineral in granites intruded into gneiss of Piedmont Plateau area: 815.

Cecil County
Allanite Occurrences
Port Deposit: allanite as an accessory mineral in granites intruded into gneiss of Piedmont Plateau area: 815.
Thorium Occurrences
Port Deposit: allanite as an accessory mineral in granites intruded into gneiss of Piedmont Plateau area: 815.

Hatchettolite Occurrences
See under individual county names and under Index III, Hatchettolite Occurrences-Maryland: 888, 940.

Howard County
Allanite Occurrences
Dorseys Run: allanite as an accessory mineral in granites intruded into gneiss of Piedmont Plateau area: 815.
Dorseys Run Station: allanite-epidote intergrowths in granite: 814.
Ellicott City: allanite: 814; allanite as an accessory mineral in granites intruded into gneiss of Piedmont Plateau area: 815.
Ellicott City, Quarries on left bank of Patapsco River at: allanite in parallel growths with epidote: 852.
Frost Feldspar Quarry on Fannie Frost farm ½ mile south of Davis: pegmatite dike intruding Cockeysville marble is a transition type between usual pegmatite of area and soda dikes of Cecil County and contains allanite and epidote among other minerals; quarry is abandoned but still is of interest to the mineralogist: 888.
Guilford: allanite as an accessory mineral in granites intruded into gneiss of Piedmont Plateau area: 815.
Ilchester: allanite: 852; allanite as an accessory mineral in granites intruded into gneiss of Piedmont Plateau area: 815; allanite-epidote intergrowths in porphyritic granite: 780; allanite here always embedded in center of epidote crystals of granite-porphyry: 782; allanite-epidote intergrowths in granite: 814; allanite-epidote intergrowths characteristic of Ilchester granite, in which the minerals are important accessories; allanite occasionally contains colorless inclusions probably biotite and apatite; mineralogical examinations: 781;

Howard County (contd.)
Allanite Occurrences
Ilchester:
similar allanite-epidote intergrowths were reported in Ellicott City and Woodstock granites but were absent in Guilford granite: 781.
Woodstock: allanite-epidote intergrowths in granite, but less abundant than at Ilchester and Dorseys Run Station: 814; allanite as an accessory mineral in granites intruded into gneiss of Piedmont Plateau area: 815.
Woodstock Granite Quarries: quarries are abandoned but granite contains allanite surrounded by epidote, cubic crystals of pyrite, and sphene: 888.
Radioactive Rocks
Ilchester: granite gave radioactivity of 1.935×10^{-12} g. Ra/g. rock: 898; redetermined radioactivity of granite, 0.91×10^{-12} g. Ra/g. rock: 899; apparatus and procedure used in making radioactivity determinations: 898; apparatus and procedure used in making radioactivity determinations: 899.
Woodstock: granite gave radioactivity of 1.448×10^{-12} g. Ra/g. rock: 898; redetermined radioactivity of granite, 1.09×10^{-12} g. Ra/g. rock: 899; apparatus and procedure used in making radioactivity determinations: 898; apparatus and procedure used in making radioactivity determinations: 899.
Thorium Occurrences
Dorseys Run: allanite as an accessory mineral in granites intruded into gneiss of Piedmont Plateau area: 815.
Dorseys Run Station: allanite-epidote intergrowths in granite: 814.

MARYLAND (contd.)

Howard County (contd.)
Thorium Occurrences
Ellicott City: allanite: 814; allanite as an accessory mineral in granites intruded into gneiss of Piedmont Plateau area: 815.
Ellicott City, Quarries on left bank of Patapsco River at: allanite in parallel growths with epidote: 852.
Guilford: allanite as an accessory mineral in granites intruded into gneiss of Piedmont Plateau area: 815.
Frost Feldspar Quarry on Fannie Frost farm ½ mile south of Davis: pegmatite dike intruding Cockeysville marble is a transition type between usual pegmatite of area and soda dikes of Cecil County and contains allanite and epidote among other minerals; quarry is abandoned but still is of interest to the mineralogist: 888.
Ilchester: allanite: 852; allanite as an accessory mineral in granites intruded into gneiss of Piedmont Plateau area:815; allanite-epidote intergrowths in porphyritic granite: 780; allanite here always embedded in center of epidote crystals of granite-porphyry: 782; allanite-epidote intergrowths in granite: 814; allanite-epidote intergrowths characteristic of Ilchester granite, in which the minerals are important accessories; allanite occasionally contains colorless inclusions, probably biotite and apatite; mineralogical examinations: 781; similar allanite-epidote intergrowths were reported in Ellicott City and Woodstock granites but were absent in Guilford granite: 781.
Woodstock: allanite as an accessory mineral in granites intruded into gneiss of Piedmont Plateau area: 815; allanite-epidote intergrowths in granite, but less abundant than at Ilchester and Dorseys Run Station: 814.

MARYLAND (contd.)

Howard County (contd.)
Thorium Occurrences
Woodstock Granite Quarries: quarries are abandoned but granite contains allanite surrounded by epidote, cubic crystals of pyrite, and sphene: 888.

(See also Baltimore-Howard Cos.: 1063.)

Microlite Occurrences
See under individual county names and under Index III, Microlite Occurrences-Maryland: 888, 990.

Monazite Occurrences
See under individual county names and under Index III, Thorium Occurrences-Maryland: 11, 731, 888.

Montgomery County
Allanite Occurrences
Garrett Park: allanite as an accessory mineral in granites intruded into gneiss of Piedmont Plateau area: 815.
Autunite Occurrences
Kensington Mica Mine (formerly called, Gilmore mine), 2 mi. N of Burnt Mills near Sligo Creek: mine was opened in a pegmatite dike, which contains autunite, apatite, beryl, microlite, hatchettolite, cleavelandite among its minerals: 888; rare earth minerals from pegmatites found on mine dumps as "rosettes" with possibly hatchettolite as center nucleus and autunite in radiating cracks: 940; autunite, microlite: 990.
Hatchettolite Occurrences
Kensington Mica Mine (formerly called, Gilmore mine), 2 mi. N of Burnt Mills near Sligo Creek: mine was opened in a pegmatite dike, which contains autunite, apatite, beryl,

MARYLAND (contd.)

Montgomery County (contd.)
Hatchettolite Occurrences
Kensington Mica Mine (formerly called, Gilmore mine), 2 mi. N of Burnt Mills near Sligo Creek: microlite, hatchettolite, cleavelandite among its minerals: 888; rare earth minerals from pegmatites found on mine dumps as "rosettes" with possibly hatchettolite as center nucleus and autunite in radiating cracks: 940.
Microlite Occurrences
Kensington Mica Mine (formerly called, Gilmore mine), 2 mi. N of Burnt Mills near Sligo Creek: mine was opened in a pegmatite dike, which contains autunite, apatite, beryl, microlite, hatchettolite, cleavelandite among its minerals: 888; autunite, microlite: 990.
Rare Earth Minerals
Kensington Mica Mine (formerly called Gilmore mine), 2 mi. N of Burnt Mills near Sligo Creek: rare earth minerals from pegmatites found on mine dumps as "rosettes" with possibly hatchettolite as center nucleus and autunite in radiating cracks: 940.
Thorium Occurrences
Garrett Park: allanite as an accessory mineral in granites intruded into gneiss of Piedmont Plateau area: 815.
Kensington Mica Mine (formerly called, Gilmore mine), 2 mi. N of Burnt Mills near Sligo Creek: mine was opened in a pegmatite dike, which contains autunite, apatite, beryl, microlite, hatchettolite, cleavelandite among its minerals: 888; autunite, microlite: 990.

MARYLAND (contd.)

Montgomery County (contd.)
Uranium Occurrences
Kensington Mica Mine (formerly called, Gilmore mine), 2 mi. N of Burnt Mills near Sligo Creek: mine was opened in a pegmatite dike, which contains autunite, apatite, beryl, microlite, hatchettolite, cleavelandite among its minerals: 888; rare earth minerals from pegmatites found on mine dumps as "rosettes" with possibly hatchettolite as center nucleus and autunite in radiating cracks: 940; autunite, microlite: 990.

Prince Georges County
Radioactive Occurrences
Earth Products Co. feldspar mine on Thompson's farm near Burtonsville, 3½ mi. from Laurel: zircon particles and radium earth in feldspar mine; haloes from radium for zircon may be traced from there: 777.

Radioactive Occurrences
See under individual county names and under Index III, Radioactive Occurrences-Maryland: 777.

Radioactive Rocks
See under individual county names and under Index III, Radioactive Rocks-Maryland: 852, 898, 935.

Rare Earth Minerals
See under individual county names and under Index III, Rare Earths Minerals-Maryland: 940.

Samarskite Occurrences
See under individual county names and under Index III, Samarskite Occurrences-Maryland: 654.

MARYLAND (contd.)

Southern Part
Monazite Occurrences
Coastal Plain: only occasional monazite grains present in Eocene sand on parts of Maryland coast adjacent to Virginia; 731.
Thorium Occurrences
Coastal Plain: only occasional monazite grains present in Eocene sand on parts of Maryland coast adjacent to Virginia: 731.

Thorium Occurrences
See under individual county names and under Index III, Thorium Occurrences-Maryland: 11, 636, 654, 731, 780, 781, 782, 814, 815, 852, 888, 990.

Uranium Occurrences
See under individual county names and under Index III, Uranium Occurrences-Maryland: 654, 704, 888, 924, 940, 990, 1063.
Bibliography of U.S.G.S. Reports: 572, 1004.

Washington County
Radioactive Rocks
Clear Spring, 2 mi. N. of: radiometric examination of Cresaptowne iron ore (?), oolitic hematite, no radioactivity found; no analysis for U or P_2O_5: 935.

Worcester County
Monazite Occurrences
Ocean City: monazite, trace: 11.
Thorium Occurrences
Ocean City: monazite, trace: 11.

MASSACHUSETTS

General
Allanite Occurrences
Eastern Part: allanite in granites: 739.
Geophysical Exploration (Ground)
Central Part: radioactivity of rocks in central part of state and a few other scattered areas, studied with car-mounted Geiger Mueller equipment; channel samples taken at outcrops and grab samples were taken of unconsolidated material; radiometric determinations on samples for eU were made in the field and chemical analyses in the U.S.G.S. Trace Elements laboratory; abnormal radioactivity was reported in the Brimfield schist and Paxton quartz schist of Carboniferous age and in the Coys Hill granite, Hubbardston granite, and Hardwick granite of Late Carboniferous or post-Carboniferous age; origin of radioactivity not known since it is neither confined to former sedimentary rocks, as should be the case if the radioactive material were syngenetic, nor is it associated exclusively with any igneous rock; the central belt was estimated to contain about 0.003% eU but less than 0.001% U in nearly all roadside materials; similar radioactivity was found in several smaller localities; in general, Massachusetts is not considered a favorable area for U deposits although some low-grade Th deposits are present: 793.
Monazite Occurrences
General: monazite in granites and gneisses: 104.
Pyrochlore Occurrences
General: pyrochlore: 883.

MASSACHUSETTS (contd.)

General (contd.)
Radioactive Rocks
Central Part: radioactivity of rocks in central part of state and a few other scattered areas, studied with carmounted Geiger Mueller equipment; channel samples were taken at outcrops and grab samples were taken of unconsolidated material; radiometric determinations on samples for eU were made in the field and chemical analyses in the U.S.G.S. Trace Elements laboratory; abnormal radioactivity was reported in the Brimfield schist and Paxton quartz schist of Carboniferous age and in the Coys Hill granite, Hubbardston granite, and Hardwick granite of Late Carboniferous or post-Carboniferous age; origin of radioactivity not known since it is neither confined to former sedimentary rocks, as should be the case if the radioactive material were sygenetic, nor is it associated exclusively with any igneous rock; the central belt was estimated to contain about 0.003% eU but less than 0.001% U in nearly all roadside materials; similar radioactivity was found in several smaller localities; in general, Massachusetts is not considered a favorable area for U deposits although some low-grade Th deposits are present: 793.
Thorium Occurrences
General: monazite in granites and gneisses: 104; pyrochlore: 883.
Central Part: radioactivity of rocks in central part of state and a few other scattered areas, studied with car-mounted Geiger Mueller equipment; channel samples were taken at outcrops and grab samples were taken of unconsolidated material; radiometric determinations on samples for eU were made in the field and chemical analyses in the U.S.G.S.

MASSACHUSETTS (contd.)

General (contd.)
Thorium Occurrences
Central Part:
Trace Elements laboratory; abnormal radioactivity was reported in the Brimfield schist and Paxton quartz schist of Carboniferous age and in the Coys Hill granite, Hubbardston granite, and Hardwick granite of Late Carboniferous or post-Carboniferous age; origin of radioactivity not known since it is neither confined to former sedimentary rocks, as should be the case if the radioactive material were syngenetic, nor is it associated exclusively with any igneous rock; the central belt was estimated to contain about 0.003% eU but less than 0.001% U in nearly all roadside materials; similar radioactivity was found in several smaller localities; in general, Massachusetts is not considered a favorable area for U deposits although some low-grade Th deposits are present: 793.
Eastern Part: allanite in granites: 739.
Uranium Exploration
Central Part: radioactivity of rocks in central part of state and a few other scattered areas, studied with carmounted Geiger Mueller equipment; channel samples were taken at outcrops and grab samples were taken of unconsolidated material; radiometric determinations on samples for eU were made in the field and chemical analyses in the U.S.G.S. Trace Elements laboratory;

MASSACHUSETTS (contd.)

General (contd.)
Uranium Exploration
Central Part:
abnormal radioactivity was reported in the Brimfield schist and Paxton quartz schist of Carboniferous age and in the Coys Hill granite, Hubbardston granite, and Hardwick granite of Late Carboniferous or post-Carboniferous age; origin of radioactivity not known since it is neither confined to former sedimentary rocks, as should be the case if the radioactive material were syngenetic, nor is it associated exclusively with any igneous rock; the central belt was estimated to contain about 0.003% eU but less than 0.001% U in nearly all roadside materials; similar radioactivity was found in several smaller localities; in general, Massachusetts is not considered a favorable area for U deposits although some low-grade Th deposits are present: 793.
Geophysical Exploration (Ground)
Central Part: radioactivity of rocks in central part of state and a few other scattered areas, studied with car-mounted Geiger Mueller equipment; channel samples were taken at outcrops and grab samples were taken of unconsolidated material; radiometric determinations on samples for eU were made in the field and chemical analyses in the U.S.G.S. Trace Elements laboratory; abnormal radioactivity was reported in the Brimfield schist and Paxton quartz schist of Carboniferous age and in the Coys Hill granite, Hubbardston granite, and Hardwick granite of Late Carboniferous or post-Carboniferous age; origin of radioactivity not known since it is neither confined to former sedimentary rocks, as should be the case if

MASSACHUSETTS (contd.)

General (contd.)
Uranium Exploration
Geophysical Exploration (Ground)
Central Part:
the radioactive material were syngenetic, nor is it associated exclusively with any igneous rock; the central belt was estimated to contain about 0.003% eU but less than 0.001% U in nearly all roadside materials; similar radioactivity was found in several smaller localities; in general, Massachusetts is not considered a favorable area for uranium deposits, although some low grade Th deposits are present: 793.
Uranium Occurrences
General: pyrochlore: 883.
Bibliography of U.S.G.S. Reports: 572, 1004.

Age Determinations
See under individual county names and under Index III, Age Determinations-Massachusetts: 821.

Allanite Occurrences
See under individual county names and under Index III, Thorium Occurrences-Massachusetts: 641, 645, 672, 701, 715, 716, 727, 735, 738, 739, 740, 741, 742, 778, 780, 787, 828, 849, 919, 925, 944, 948, 950, 1006, 1007, 1008, 1072, 1088, 1098, 1100.

Autunite Occurrences
See under individual county names and under Index III, Autunite Occurrences-Massachusetts: 672, 738, 797, 963, 1100.

Berkshire County
Allanite Occurrences
Becket: allanite: 738;

MASSACHUSETTS (contd.)

Berkshire County (contd.)

Allanite Occurrences

Beckett: allanite abundant in Washington (Precambrian) gneiss; occurs in scattered pitch-black small crystals with dark reddish decomposition borders and is characterized by the slight puckering of the fracture, in the enclosing gneiss, which radiates from each crystal: 742.

Dalton: allanite abundant in Washington (Precambrian) gneiss; occurs in scattered pitch-black small crystals with dark reddish decomposition borders and is characterized by the slight puckering of the fracture, in the enclosing gneiss, which radiates from each crystal; one of the best allanite localities, on brook south of Dalton clubhouse: 742.

Hinsdale: allanite abundant in pegmatites in Hinsdale gneiss: 739; Archean oval of allanite-magnetite gneiss surrounded by band of coarse limestone: 741; allanite abundant in Washington (Precambrian) gneiss; occurs in scattered pitch-black small crystals with dark reddish decomposition borders and is characterized by the slight puckering of the fracture, in the enclosing gneiss, which radiates from each crystal: 742.

Hudson and Chester quarry in Becket: allanite, sometimes rimmed by epidote, as an accessory mineral in "Chester dark" and "Chester light" granites: 716.

Otis: allanite abundant in Washington (Precambrian) gneiss; occurs in scattered pitch-black small crystals with dark reddish decomposition borders and is characterized by the slight puckering of the fracture, in the enclosing gneiss, which radiates from each crystal: 742.

MASSACHUSETTS (contd.)

Berkshire County (contd.)

Allanite Occurrences

Sandisfield: allanite abundant in Washington (Precambrian) gneiss; occurs in scattered pitch-black small crystals with dark reddish decomposition borders and is characterized by the slight puckering of the fracture, in the enclosing gneiss, which radiates from each crystal: 742.

South Windsor: pegmatites border or replace Archean limestone here and allanite bordered by xanthorthite is surrounded by the usual puckering: 739.

Tyringham: allanite abundant in Washington (Precambrian) gneiss; occurs in scattered pitch-black small crystals with dark reddish decomposition borders and is characterized by the slight puckering of the fracture, in the enclosing gneiss, which radiates from each crystal; one of the best allanite localities, opposite D. Clark's house in Tyringham: 742.

Warner Mountain at Sheffield: allanite-epidote intergrowths in gneiss at several localities in area: 780.

Washington: allanite in border zone between Precambrian gneiss and Cambrian formations: 739; allanite abundant in Washington (Precambrian) gneiss; occurs in scattered pitch-black small crystals with dark reddish decomposition borders and is characterized by the slight puckering of the fracture, in the enclosing gneiss, which radiates from each crystal: 742.

Gadolinite Occurrences

Beckett: gadolinite: 950.

MASSACHUSETTS (contd.)

Berkshire County (contd.)

Radioactive Rocks

Mount Greylock: radioactivity determinations on Greylock schist, a mica-chlorite-quartz schist of Ordovician age with knots and veins of milky white massive quartz: schist, 0.003% eU; schist near quartz veins, 0.003% eU; vein quartz, 0.001% eU; and schist and vein quartz, 0.002% eU; no determinations were made for U or ThO_2 content; schist was sporadically radioactive along road for about 2 miles: 793.

North Adams: radioactivity determinations on Hoosac dark mica-feldspar schist of Ordovician age from the Hairpin Turn: 0.003% eU; no determinations made for U or ThO_2 content; schist was radioactive along road for about 0.5 mi. but no correlation of bedding with radioactivity was observed: 793.

Radioactive Gases

Williamstown: radioactivity of water of one spring ranged from 13 to 216 x 10^{-12} curies/liter while the gas ranged from 759 to 7290 x 10^{-12} curies/liter: 903.

General: methods used in making radioactivity determinations on gas and water of springs: 959.

Rich spring on opposite side of Hoosac River from other springs, issues from base of Northwest Hill and is not enclosed: radioactivity determinations on gas and water of spring gave: 75.9 x 10^{-11} g. Ra/liter for gas and 0.897 x 10^{-11} g. Ra/liter for water: 959.

Sand Spring: radioactivity determinations on gas and water of spring gave: 653 x 10^{-11} g. Ra/liter for gas and 12.16 x 10^{-11} g. Ra/liter for water: 959.

Wampanoag spring: radioactivity determinations on gas and water of spring gave: 729 x 10^{-11} g. Ra/liter for gas and 21.6 x 10^{-11} g. Ra/liter for water: 959.

MASSACHUSETTS (contd.)

Berkshire County (contd.)

Radioactive Springs

Williamstown: radioactivity of water of one spring ranged from 13 to 216 x 10^{-12} curies/liter while the gas ranged from 759 to 7290 x 10^{-12} curies/liter: 903.

General: methods used in making radioactivity determinations on gas and water of springs: 959.

Cold spring, part of Williamstown water supply system: radioactivity determinations on water gave 1.31 x 10^{-11} g. Ra/liter; water used was taken from reservoir, so much of its radioactivity was lost: 959.

Rich spring on opposite side of Hoosac River from other springs, issues from base of Northwest Hill and is not enclosed: radioactivity determinations on gas and water of spring gave: 75.9 x 10^{-11} g. Ra/liter for gas and 0.897 x 10^{-11} g. Ra/liter for water: 959.

Sand spring: radioactivity determinations on gas and water of spring gave: 653 x 10^{-11} g. Ra/liter for gas and 12.16 x 10^{-11} g. Ra/liter for water: 959.

Sherman spring, part of Williamstown water supply system: radioactivity determinations on water taken directly from spring gave 4.11 x 10^{-11} g.Ra/liter: 959.

Wampanoag spring: radioactivity determinations on gas and water of spring gave: 729 x 10^{-11} g. Ra/liter for gas and 21.6 x 10^{-11} g. Ra/liter for water: 959.

Thorium Occurrences

Becket: allanite: 738;

MASSACHUSETTS (contd.)

Berkshire County (contd.)

Thorium Occurrences

Becket: allanite abundant in Washington (Precambrian) gneiss; occurs in scattered pitch-black small crystals with dark reddish decomposition borders and is characterized by the slight puckering of the fracture, in the enclosing gneiss, which radiates from each crystal: 742; gadolinite: 950.

Dalton: allanite abundant in Washington (Precambrian) gneiss; occurs in scattered pitch-black small crystals with dark reddish decomposition borders and is characterized by the slight puckering of the fracture, in the enclosing gneiss, which radiates from each crystal; one of the best allanite localities, on brook south of Dalton clubhouse: 742.

Hinsdale: allanite abundant in pegmatites in Hinsdale gneiss: 739; Archean oval of allanite-magnetite gneiss surrounded by band of coarse limestone: 741; allanite abundant in Washington (Precambrian) gneiss; occurs in scattered pitch-black small crystals with dark reddish decomposition borders and is characterized by the slight puckering of the fracture, in the enclosing gneiss, which radiates from each crystal: 742.

Hudson and Chester quarry in Becket: allanite, sometimes rimmed by epidote, as an accessory mineral in "Chester dark" and "Chester light" granites: 716.

Otis: allanite abundant in Washington (Precambrian) gneiss; occurs in scattered pitch-black small crystals with dark reddish decomposition borders and is characterized by the slight puckering of the fracture, in the enclosing gneiss, which radiates from each crystal: 742.

MASSACHUSETTS (contd.)

Berkshire County (contd.)

Thorium Occurrences

Sandisfield: allanite abundant in Washington (Precambrian) gneiss; occurs in scattered pitch-black small crystals with dark reddish decomposition borders and is characterized by the slight puckering of the fracture, in the enclosing gneiss, which radiates from each crystal: 742.

South Windsor: pegmatites border or replace Archean limestone here and allanite bordered by xanthorthite is surrounded by the usual puckering: 739.

Tyringham: allanite abundant in Washington (Precambrian) gneiss; occurs in scattered pitch-black small crystals with dark reddish decomposition borders and is characterized by the slight puckering of the fracture, in the enclosing gneiss, which radiates from each crystal; one of the best allanite localities, opposite D. Clark's house in Tyringham: 742.

Warner Mountain at Sheffield: allanite-epidote intergrowths in gneiss at several localities in area: 780.

Washington: allanite in border zone between Precambrian gneiss and Cambrian formations: 739; allanite abundant in Washington (Precambrian) gneiss; occurs in scattered pitch-black small crystals with dark reddish decomposition borders and is characterized by the slight puckering of the fracture, in the enclosing gneiss, which radiates from each crystal: 742.

(See also Berkshire-Hampden Cos.: 715)

MASSACHUSETTS (contd.)

Berkshire & Hampden Counties
Allanite Occurrences
Hudson and Chester Granite quarry in Becket, almost 7 mi. SE of Becket village, and in Chester, almost 3 mi. SW of Chester village: allanite as an accessory mineral, rimmed with epidote, in the "Chester dark" and "Chester light" granites, both muscovite-biotite granites of medium to dark blueish gray and medium blueish gray color: 715.
Thorium Occurrences
Hudson and Chester Granite quarry in Becket, almost 7 mi. SE of Becket village, and in Chester, almost 3 mi. SW of Chester village: allanite as an accessory mineral, rimmed with epidote, in the "Chester dark" and "Chester light" granites, both muscovite-biotite granites of medium to dark blueish gray and medium blueish gray color: 715.

Bibliographies
Uranium Occurrences
Bibliography of U.S.G.S. Reports: 572, 1004.

Bristol County
Allanite Occurrences
Beattie quarry in Fall River: allanite as an accessory mineral in "Fall River gray" granite: 716.
Paracolumbite Occurrences
Taunton: paracolumbite: 950.
Taunton, southwest of: paracolumbite disseminated in minute quantities in a granite boulder made up almost entirely of greenish-white feldspar: 951.
Radioactive Rocks
North Attleboro: helium and radioactivity data for: basalt, 0.11 x 10^{-5} cc. He/g., 2.75 x 10^{-13} g. Ra/g., 3.22 x 10^{-6} g.Th/g., and 0.57 alphas/mg./hr.; rhyolite, 1.57 x 10^{-5} cc. He/g., 6.50 x 10^{-13} g. Ra/g., 9.0 x 10^{-6} g.Th/g., and average activity, 1.42 alpha /mg/hr.:798.

MASSACHUSETTS (contd.)

Bristol County (contd.)
Thorium Occurrences
Beattie quarry in Fall River: allanite as an accessory mineral in "Fall River gray" granite: 716.
North Attleboro: helium and radioactivity data for: basalt, 0.11 x 10^{-5} cc. He/g., 2.75 x 10^{-13} g. Ra/g., 3.22 x 10^{-6} g. Th/g., and 0.57 alphas/mg./hr.; rhyolite, 1.57 x 10^{-5} cc. He/g., 6.50 x 10^{-13} g. Ra/g., 9.0 x 10^{-6} g. Th/g., and average activity, 1.42 alphas/mg./hr.: 798.
Uranium Occurrences
Taunton: paracolumbite: 950.
Taunton, southwest of: paracolumbite disseminated in minute quantities in a granite boulder made up almost entirely of greenish-white feldspar: 951.

Cyrtolite Occurrences
See under individual county names and under Index III, Cyrtolite Occurrences-Massachusetts: 672, 738, 739, 797, 834, 1006, 1098.

Essex County
Allanite Occurrences
Andrews Point: pegmatites associated with alkalic granites of Cape Ann include the following in their mineral content; cyrtolite, allanite, fergusonite, yttrocerite, tantalite, thorite, gadolinite, but many of them are so rare that they are difficult to find and obviously have no economic value: 672.
Babson Farm quarry: pegmatites, associated with alkalic granites of Cape Ann include the following in their mineral content; cyrtolite, allanite, fergusonite, yttrocerite, tantalite, thorite, gadolinite, but many of them are so rare that they are difficult to find and obviously have no economic value: 672.

MASSACHUSETTS (contd.)

Essex County (contd.)
Allanite Occurrences
Briar Neck near Gloucester: pegmatites associated with alkalic granites of Cape Ann include the following in their mineral content; cyrtolite, allanite, fergusonite, yttrocerite, tantalite, thorite, gadolinite, but many of them are so rare that they are difficult to find and obviously have no economic value: 672.
Cape Ann: allanite as an accessory mineral in biotite-bearing hornblende-granite in occasional anhedrons, irregularly shaped and chestnut-brown in color with strong pleochroism: 727; pegmatites contained, among other minerals, cyrtolite, allanite, fergusonite, yttrocerite, tantalite, thorite, gadolinite but no tourmaline: 1100.
Cape Ann granite: allanite as rare accessory mineral in granite: 1006; rare minerals present in the pegmatites of Cape Ann granite include: allanite, cyrtolite, fergusonite, gadolinite, thorite, and yttrocerite; cyrtolite occurs as small groups of brown crystals with curved faces and usually associated with white quartz and granular black chlorite, thorite as the variety, orangite, associated with fluorite, fergusonite as small irregular grains and narrow lens-shaped plates in feldspar and in graphic granite, and gadolinite in "strained zone" in quartz; at Rockport yttrocerite is reported on massive quartz: 1006; pegmatites in the granite are similar in rare mineral content at Quincy, Cape Ann, and Rockport, Massachusetts, and Baringer Hill, Texas, although the occurrences also present some striking differences: 1006.

MASSACHUSETTS (contd.)

Essex County (contd.)
Allanite Occurrences
Cape Ann
Rockport: olive-green granites stained by limonite in rift cracks and around opaque minerals· also contains biotite and allanite: 715; pegmatites in the granite are similar in rare mineral content at Quincy, Cape Ann, and Rockport, Massachusetts, and Baringer Hill, Texas, although the occurrences also present some striking differences: 1006; minerals reported at both this area and Baringer Hill include: allanite, cyrtolite, fergusonite, magnetite, smoky quartz, gadolinite; yttrocerite reported here: 1006.
Bay View dark-granite prospect, opened by Rockport Granite Co., between Blood Ledge quarry and the "Deep Pit" near Bay View: allanite, magnetite, and zircon, somewhat abundant as accessory minerals in the dark brownish gray riebeckite-aegirite-biotite granite: 715; allanite as an accessory mineral, somewhat abundant, in granite: 716.
Blood Ledge quarry, 3/5 mi. ENE of Bay View, operated by Rockport Granite Co.: allanite as an accessory mineral in the "Bay View green," a hornblende granite of dark-olive gray color: 715; allanite as an accessory mineral in "Rockport sea-green" granite with some of limonite proceeding radially from allanite particles: 716.

MASSACHUSETTS (contd.)

Essex County (contd.)
Allanite Occurrences
Cape Ann
Rockport
Cheves Green Granite quarry 1 3/4 mi. NW of Rockport: allanite as an accessory mineral mostly enclosed in the hornblende particles in "green granite" with some limonite staining proceeding radially from the allanite: 716.
Cheves Green Granite quarry 250 ft. S of Devils Rock quarry: allanite, mostly within hornblende particles, as an accessory mineral in the "green granite": 715.
"Deep Pit" about 1/5 mi. from tidewater at Bay View, on W side of the Cape, operated by Rockport Granite Co.: allanite as an accessory mineral in the "Bay View gray," a medium-gray hornblende granite: 715; allanite as an accessory mineral in "Bay View gray" granite: 716.
Devils Rock quarry, ½ mi. SE of Lanesville, operated by William R. Cheves: allanite as an accessory mineral in medium-gray hornblende granite: 715; allanite as an accessory mineral in a gray hornblende granite: 716.
Nickerson quarries ¼ mi. SE of Folly Cove: allanite as an accessory mineral in medium-gray hornblende granite: 715.
Pigeon Hill quarry at S foot of Pigeon Hill, operated by the Pigeon Hill Granite Co.: allanite as an accessory in the medium-gray hornblende granite: 715.
Pigeon Hill quarry (lower) at S foot of Pigeon Hill about 1 mi. NNW of Rockport: allanite as an accessory mineral in "Rockport light gray" granite: 716.

MASSACHUSETTS (contd.)

Essex County (contd.)
Allanite Occurrences
Cape Ann
Rockport
Rockport "gray granite": allanite as an accessory mineral: 715.
Rockport "green granite": allanite as an accessory mineral: 715.
Rockport quarry: pegmatites associated with alkalic granites of Cape Ann include the following in their mineral content; cyrtolite, allanite, fergusonite, yttrocerite, tantalite, thorite, gadolinite, but many of them are so rare that they are difficult to find and obviously have no economic value: 672.
Upper Pigeon Hill quarry, 1/3 mi. SW of Pigeon Hill, operated by Pigeon Hill Granite Co.: allanite as an accessory in the medium-gray hornblende granite, like the Pigeon Hill quarry: 715.
Den quarry on Peabody and Lynn town line, 2 3/4 mi. NNW of Lynn station: allanite as an accessory mineral and as inclusions in black hornblende and augite in "Peabody green" granite, with limonite staining coming from allanite and augite: 716.
Eastern Point from quarry near Lighthouse: allanite in granite: 1008.
Linehan quarry in Peabody on a knoll ¼ mi. E of Bartholomew Pond: allanite as an accessory mineral in "Peabody green" granite: 716.
Lynnfield: allanite in granite: 787.
Marblehead Neck: allanite in granite: 1008.
Peabody stock: dark reddish brown mineral, possibly allanite, in granite: 701.

MASSACHUSETTS (contd.)

Essex County (contd.)

Allanite Occurrences

Robin Rock quarry in Lynnfield 4/5 mi. SSW of South Lynnfield station: allanite as an accessory mineral and as inclusion in hornblende in "Robin Rock green" granite: 716.

Swampscott: allanite in granite, first reported here in 1862: 1008.

Cyrtolite Occurrences

Andrews Point: pegmatites associated with alkalic granites of Cape Ann include the following in their mineral content; cyrtolite, allanite, fergusonite, yttrocerite, tantalite, thorite, gadolinite, but many of them are so rare that they are difficult to find and obviously have no economic value: 672.

Babson Farm quarry: pegmatites associated with alkalic granites of Cape Ann include the following in their mineral content; cyrtolite, allanite, fergusonite, yttrocerite, tantalite, thorite, gadolinite, but many of them are so rare that they are difficult to find and obviously have no economic value: 672.

Briar Neck near Gloucester: pegmatites associated with alkalic granites of Cape Ann include the following in their mineral content, cyrtolite; allanite, fergusonite, yttrocerite, tantalite, thorite, gadolinite, but many of them are so rare that they are difficult to find and obviously have no economic value: 672.

Cape Ann: pegmatites contained, among other minerals, cyrtolite, allanite, fergusonite, yttrocerite, tantalite, thorite, gadolinite but no tourmaline: 1100.

Cape Ann granite: pegmatites in the granite are similar in rare mineral content at Quincy, Cape Ann and Rockport, Massachusetts, and Baringer Hill, Texas, although the occurrences also present some striking differences:1006.

MASSACHUSETTS (contd.)

Essex County (contd.)

Cyrtolite Occurrences

Cape Ann

Cape Ann granite: rare minerals present in the pegmatites of Cape Ann granite include: allanite, cyrtolite, fergusonite, gadolinite, thorite, and yttrocerite; cyrtolite occurs as small groups of brown crystals with curved faces and usually associated with white quartz and granular black chlorite, thorite as the variety, orangite, associated with fluorite, fergusonite as small irregular grains and narrow lens-shaped plates in feldspar and in graphic granite, and gadolinite in "strained zone" in quartz; at Rockport yttrocerite is reported on massive quartz: 1006.

Rockport: cyrtolite: 834; cyrtolite, fergusonite: 1098; minerals reported at both this area and Baringer Hill include: allanite, cyrtolite, fergusonite, magnetite, smoky quartz, gadolinite; yttrocerite reported here: 1006; pegmatites in the granite are similar in rare mineral content at Quincy, Cape Ann, and Rockport, Massachusetts, and Baringer Hill, Texas, although the occurrences also present some striking differences: 1006.

Rockport quarry: pegmatites associated with alkalic granites of Cape Ann include the following in their mineral content; cyrtolite, allanite, fergusonite, yttrocerite, tantalite, thorite, gadolinite, but many of them are so rare that they are difficult to find and obviously have no economic value: 672.

MASSACHUSETTS (contd.)

Essex County (contd.)
Fergusonite Occurrences
Andrews Point: pegmatites associated with alkalic granites of Cape Ann include the following in their mineral content; cyrtolite, allanite, fergusonite, yttrocerite, tantalite, thorite, gadolinite, but many of them are so rare that they are difficult to find and obviously have no economic value: 672.
Babson Farm quarry: pegmatites associated with alkalic granites of Cape Ann include the following in their mineral content; cyrtolite, allanite, fergusonite, yttrocerite, tantalite, thorite, gadolinite, but many of them are so rare that they are difficult to find and obviously have no economic value: 672.
Briar Neck near Gloucester: pegmatites associated with alkalic granites of Cape Ann include the following in their mineral content; cyrtolite, allanite, fergusonite, yttrocerite, tantalite, thorite, gadolinite, but many of them are so rare that they are difficult to find and obviously have no economic value: 672.
Cape Ann: pegmatites contained, among other minerals, cyrtolite, allanite, fergusonite, yttrocerite, tantalite, thorite, gadolinite but no tourmaline: 1100.
Cape Ann granite: rare minerals present in the pegmatites of Cape Ann granite include: allanite, cyrtolite, fergusonite, gadolinite, thorite, and yttrocerite; cyrtolite occurs as small groups of brown crystals with curved faces and usually associated with white quartz and granular black chlorite, thorite as the variety, orangite, associated with fluorite, fergusonite as small irregular grains and narrow lens-shaped plates in feldspar and in graphic

MASSACHUSETTS (contd.)

Essex County (contd.)
Fergusonite Occurrences
Cape Ann
Cape Ann granite:
granite, and gadolinite in "strained zone" in quartz; at Rockport yttrocerite is reported on massive quartz:1006; pegmatites in the granite are similar in rare mineral content at Quincy, Cape Ann, and Rockport, Massachusetts, and Baringer Hill, Texas, although the occurrences also present some striking differences: 1006.
Rockport: cyrtolite, fergusonite: 1098; fergusonite in granite: 653; pegmatites in the granite are similar in rare mineral content at Quincy, Cape Ann, and Rockport, Massachusetts, and Baringer Hill, Texas, although the occurrences also present some striking differences: 1006; minerals reported at both this area and Baringer Hill include: allanite, cyrtolite, fergusonite, magnetite, smoky quartz, gadolinite; yttrocerite reported here: 1006.
Rockport quarry: pegmatites associated with alkalic granites of Cape Ann include the following in their mineral content; cyrtolite, allanite, fergusonite, yttrocerite, tantalite, thorite, gadolinite, but many of them are so rare that they are difficult to find and obviously have no economic value: 672.
Gadolinite Occurrences
Andrews Point: pegmatites associated with alkalic granites of Cape Ann include the following in their mineral content; cyrtolite, allanite, fergusonite, yttrocerite, tantalite, thorite, gadolinite, but many of them are so rare that they are difficult to find and obviously have no economic value: 672.

MASSACHUSETTS (contd.)

Essex County (contd.)
Gadolinite Occurrences
Babson Farm quarry: pegmatites associated with alkalic granites of Cape Ann include the following in their mineral content; cyrtolite, allanite, fergusonite, yttrocerite, tantalite, thorite, gadolinite, but many of them are so rare that they are difficult to find and obviously have no economic value: 672.
Briar Neck near Gloucester: pegmatites associated with alkalic granites of Cape Ann include the following in their mineral content; cyrtolite, allanite, fergusonite, yttrocerite, tantalite, thorite, gadolinite, but many of them are so rare that they are difficult to find and obviously have no economic value: 672.
Cape Ann: pegmatites contained, among other minerals, cyrtolite, allanite, fergusonite, yttrocerite, tantalite, thorite, gadolinite, but no tourmaline: 1100.
Cape Ann granite: rare minerals present in the pegmatites of Cape Ann granite include: allanite, cyrtolite, fergusonite, gadolinite, thorite, and yttrocerite; cyrtolite occurs as small groups of brown crystals with curved faces and usually associated with white quartz and granular black chlorite, thorite as the variety, orangite, associated with fluorite, fergusonite as small irregular grains and narrow lens-shaped plates in feldspar and in graphic granite, and gadolinite in "strained zone" in quartz; at Rockport yttrocerite is reported on massive quartz: 1006; pegmatites in the granite are similar in rare mineral content at Quincy, Cape Ann, and Rockport, Massachusetts, and Baringer Hill, Texas, although the occurrences also present some striking differences:1006.

MASSACHUSETTS (contd.)

Essex County (contd.)
Gadolinite Occurrences
Cape Ann
Rockport: minerals reported at both this area and Baringer Hill include: allanite, crytolite, fergusonite, magnetite, smoky quartz, gadolinite; yttrocerite reported here: 1006; pegmatites in the granite are similar in rare mineral content at Quincy, Cape Ann, and Rockport, Massachusetts, and Baringer Hill, Texas, although the occurrences also present some striking differences: 1006.
Rockport quarry: pegmatites associated with alkalic granites of Cape Ann include the following in their mineral content; cyrtolite, allanite, fergusonite, yttrocerite, tantalite, thorite, gadolinite, but many of them are so rare that they are difficult to find and obviously have no economic value: 672.
Orangite Occurrences
Cape Ann
Cape Ann granite: pegmatites in the granite are similar in rare mineral content at Quincy, Cape Ann, and Rockport, Massachusetts, and Baringer Hill, Texas, although the occurrences also present some striking differences: 1006; rare minerals present in the pegmatites of Cape Ann granite include: allanite, cyrtolite, fergusonite, gadolinite, thorite, and yttrocerite; cyrtolite occurs as small groups of brown crystals with curved faces and usually associated with white quartz and granular black chlorite, thorite as the variety, orangite, associated with fluorite, fergusonite as small irregular grains and narrow lens-shaped plates

MASSACHUSETTS (contd.)

Essex County (contd.)
Orangite Occurrences
Cape Ann
Cape Ann granite:
in feldspar and in graphic granite, and gadolinite in "strained zone" in quartz; at Rockport yttrocerite is reported on massive quartz: 1006
Orthite Occurrences
Swampscott Beach near Clifton House: orthite embedded in quartz and, sometimes, in feldspar too; mineralogy: 643.
Radioactive Minerals
Cape Ann
Rockport
Upper Pigeon Hill quarry: radioactivity determinations of granulated samples from the center of blocks of Cape Ann or Essex granite, taken from depths greater than 150 ft., gave the following results: granite, 9.2×10^{-5} cc. He/g, 18.8×10^{-13} g. Ra/g, 16.4×10^{-6} gTh/g, activity index 3.40 alpha/mg/hr, He index 83; test by C. Goodman gave 7.9×10^{-5} cc. He/g. activity index 2.19 alpha/mg/hr, He index 110:802; cognate xenolite, 10.8×10^{-5} cc. He/g, 19.5×10^{-13} g. Ra/g, 22.2×10^{-6} g. Th/g, activity index 3.98 alpha/mg/hr, He index 84; test by C. Goodman gave 11.2×10^{-5} cc. He/g, activity index 3.94 alpha/mg/hr, and He index 88:802
three tests on quartered portions of large granulated sample of granite gave: 10.8×10^{-5} cc. He/g, activity index 2.86 alpha/mg/hr, He index 115: 10.8×10^{-5} cc. He/g, 19.85×10^{-13} g. Ra/g, 20.5×10^{-6} g. Th/g, activity index 3.88 alpha/mg/hr, He index 86; and 10.3×10^{-5} cc. He/g, 21.3×10^{-13} g. Ra/g, 18.0×10^{-6} g. Th/g, activity index 3.80 alpha/mg/hr, He index 83; minerals separated from same granite

MASSACHUSETTS (contd.)

Essex County (contd.)
Radioactive Minerals
Cape Ann
Rockport
Upper Pigeon Hill quarry:
sample just after breaking up a second block of specimen: feldspar, 1.9×10^{-5} cc. He/g, 5.31×10^{-13} g. Ra/g, 3.33×10^{-6} g. Th/g, activity index 0.845 alpha/mg/hr, He index 69: quartz, 5.3×10^{-5} cc. He/g, 8.85×10^{-13} g. Ra/g, 6.32×10^{-6} g. Th/g, activity index 1.48 alpha/mg/hr, He index 110; femic minerals, 38×10^{-5} cc. He/g, 56×10^{-13} g. Ra/g, 42×10^{-6} g. Th/g, activity index 9.53 alpha/mg/hr, He index 122; additional results from minerals tested: quartz, finely powdered and standing 2 mos. before testing, 5.8×10^{-5} cc. He/g, He index 120, no other information given; quartz, separated from freshly broken portions of rock and ground to less than 200 mesh, 3.9×10^{-5} cc. He/g, activity index 1.58 alpha/mg/hr, He index 76; same ground quartz, after standing 1 day, being pumped at high vacuum for 3 days, and left at high vacuum for 7 more days, 3.1×10^{-5} cc. He/g, He index 60, no other information given: 802;
granite from same quarried block as ground specimen tested one year after collection, 6.71×10^{-5} cc. He/g, activity index 2.78 alpha/mg/hr, He index 74; tests on minerals from this granite gave: feldspar 1.04×10^{-5} cc. He/g, activity index 0.72 alpha/mg/hr, He index 44; quartz 2.88×10^{-5}

MASSACHUSETTS (contd.)

Essex County (contd.)
Radioactive Minerals
Cape Ann
Rockport
Upper Pigeon Hill quarry:
cc.He/g, activity index 0.97 alpha/mg/hr., He index 91; femic minerals 74 x 10^{-5} cc. He/g, activity index 12 alpha/mg/hr., He index 189: 802; portion of same granite specimen, ground and resampled, activity index 1.40 alpha/mg/hr., only value given: 802; average values for minerals in and for the Cape Ann granite itself would be: quartz, 4.1 x 10^{-5} cc.He/g, 8.0 x 10^{-13} g.Ra/g, 5.75 x 10^{-6} g.Th/g, Th/U ratio 2.5, activity index 1.34 alpha/mg/hr., He index 94; feldspar, 1.5 x 10^{-5} cc.He/g, 4.9 x 10^{-13} g.Ra/g, 3.1 x 10^{-6} g.Th/g, Th/U ratio 2.2, activity index 0.78 alpha/mg/hr, He index 59; femic minerals, 56 x 10^{-5} cc.He/g, 64 x 10^{-13} g.Ra/g, 48 x 10^{-6} g.Th/g, Th/U ratio 2.5, activity index 10.8 alpha/mg/hr., He index 159; granite itself, 9.7 x 10^{-5} cc.He/g, 17.8 x 10^{-13} g.Ra/g, 17.1 x 10^{-6} g.Th/g, Th/U ratio 3.4, activity index 3.35 alpha/mg/hr., He index 89; weighted values for granite based on helium and radioactivity contents of individual minerals and taking average composition of granulated samples as 32.5% quartz, 62% feldspar, and 5.5% femic minerals: 5.8 x 10^{-5} cc.He/g, 9.2 x 10^{-13} g.Ra/g, 6.4 x 10^{-6} g.Th/g, Th/U ratio 2.5, activity index 1.52, He index 115; discrepancies between experimental and calculated values for granite probably caused by inhomogeneities, which might be corrected by testing more representative samples of the minerals, or detecting presence of more active minor constituents that contribute in an undetermined way to helium content and radioactivity of the rock: 802;

MASSACHUSETTS (contd.)

Essex County (contd.)
Radioactive Minerals
Cape Ann
Rockport
Upper Pigeon Hill quarry:
distribution of radioactive elements in Essex County granite: feldspar, Th/U ratio 2.2, activity index 0.78 alpha/mg/hr., relative radioactivity 1.0 radioactivity 14.5%; quartz, Th/U ratio 2.2, activity index 1.34 alpha/mg/hr., relative radioactivity (cf. feldspar) 1.7, radioactivity 13%; biotite and hornblende (55%), Th/U ratio 2.6, activity index 17.5 alpha/mg/hr., relative radioactivity (cf. feldspar) 22.5, radioactivity 38%; allanite, zircon (trace), calculated Th/U ratio 4, calculated radioactivity 35.5%; granite, Th/U ratio 3.2, activity index 3.30 alpha/mg/hr., relative radioactivity (cf. feldspar) 4.2, radioactivity 100%; xenolith, Th/U ratio 4.0, activity index 3.96 alpha/mg/hr, relative radioactivity (cf. feldspar) 5.1: 802;
comparison of ratios of He index of comparable parts of Cape Ann or Essex and Quincy granites gave: granite 1.5, quartz 1.4, feldspar 1.1, and femics 2.0 suggesting that Essex granite on Cape Ann is older, probably Devonian in age, like the coastal granites to the north, while Quincy granite is probably Carboniferous in age: 802;
methods used in making radioactivity determinations: 802.

MASSACHUSETTS (contd.)

Essex County (contd.)
Radioactive Rocks
Cape Ann
General: all Quincy granite on Cape Ann estimated to contain 0.003% eU: 793.
Johnson Quarry: helium and radioactivity data for alkali granite, 10.0×10^{-5} cc. He/g., 17.8×10^{-13} g. Ra/g., 17.1×10^{-6} g. Th/g., and activity 3.35 alpha/mg./hr.: 803; helium and radioactivity data for feldspar, 1.6×10^{-5} cc. He/g., 4.9×10^{-13} g. Ra/g., 3.1×10^{-6} g. Th/g., and activity 0.75 alpha/mg./hr.: 803; helium and radioactivity data for cognate xenolith, 10.8×10^{-5} cc. He/g., 19.5×10^{-13} g. Ra/g., 22.2×10^{-6} g. Th/g., and activity 3.99 alpha/mg./hr.: 803; helium and radioactivity data for mafics, 5.8×10^{-5} cc. He/g., 64×10^{-13} g. Ra/g., 48×10^{-6} g. Th/g., and activity 10.8 alpha/mg./hr.:803; helium and radioactivity data for quartz, 4.9×10^{-5} cc. He/g., 8.0×10^{-13} g. Ra/g., 5.75×10^{-6} g. Th/g., and activity 1.34 alpha/mg./hr.: 803.
Pigeon Cove: radioactivity determinations on grab samples of Quincy dark hornblende granite of early Carboniferous age: 0.003% eU, 0.0004% U, and 0.001% ThO_2: 793.
Rockport: radioactivity determinations on samples of Rockport granite and a Rockport granite inclusion gave respectively 10.5 and 11.6×10^{-5} cc. He/g, 18.8 and 19.5×10^{-13} g. Ra/g, 16.4 and 22.2×10^{-6} g. Th/g, age 110 and 86 m.y. according to Goodman and 92 and 86 m.y. according to Keevil:746; granite gave radioactivity of 0.955×10^{-12} g. Ra/g. rock: 898; redetermined radioactivity of granite, 0.72×10^{-12} g. Ra/g. rock: 899; apparatus and procedure used in making radioactivity determinations: 898, 899.

MASSACHUSETTS (contd.)

Essex County (contd.)
Radioactive Rocks
Cape Ann
Rockport
Upper Pigeon Hill quarry: Rockport granite, possibly pre-Triassic and post-Cambrian in age, radioactivity $2.3 \pm 0.3 \times 10^{-12}$ g. Ra/g. rock (mean value), $5.1 \pm 1.0 \times 10^{-6}$ g U/g rock, 2.6×10^{-6} g. Th/g. rock, and Th/U ratio 0.5; Rockport xenolith, radioactivity $1.80 \pm 0.06 \times 10^{-12}$ g. Ra/g. rock, $6.5 \pm 0.9 \times 10^{-6}$ g. U/g. rock, $17 \pm 4.0 \times 10^{-6}$ g. Th/g, and Th/U ratio 2.6: 745; radioactivity determinations on granulated samples from the center of blocks of Cape Ann or Essex granite, taken from depths greater than 150 ft., gave the following results:
granite, 9.2×10^{-5} cc. He/g, 18.8×10^{-13} g. Ra/g, 16.4×10^{-6} g. Th/g, activity index 3.40 alpha/mg/hr, He index 83; test by C. Goodman gave 7.9×10^{-5} cc. He/g, activity index 2.19 alpha/mg/hr, He index 110: 802;
cognate xenolith, 10.8×10^{-5} cc. He/g, 19.5×10^{-13} g. Ra/g, 22.2×10^{-6} g. Th/g, activity index 3.98 alpha/mg/hr, He index 84; test by C. Goodman gave 11.2×10^{-5} cc. He/g, activity index 3.94 alpha/mg/hr, and He index 88: 802; three tests on quartered portions of large granulated sample of granite gave: 10.8×10^{-5} cc. He/g, activity index 2.86 alpha/mg/hr, He index 115; 10.8×10^{-5} cc. He/g, 19.85×10^{-13} g. Ra/g, 20.5×10^{-6} g. Th/g, activity index 3.88 alpha/mg/hr, He index 86; and 10.3×10^{-5} cc. He/g, 21.3×10^{-13} g. Ra/g, 18.0×10^{-6} g. Th/g, activity index

MASSACHUSETTS (contd.)

Essex County (contd.)
Radioactive Rocks
Cape Ann
Rockport
Upper Pigeon Hill quarry:
3.80 alpha/mg/hr, He index 83; minerals separated from same granite sample just after breaking up a second block of specimen: feldspar, 1.9 x 10^{-5} cc.He/g, 5.31 x 10^{-13} g. Ra/g, 3.33 x 10^{-6} g.Th/g, activity index 0.845 alpha/mg/hr, He index 69; quartz, 5.3 x 10^{-5} cc.He/g, 8.85 x 10^{-13} g.Ra/g, 6.32 x 10^{-6} g.Th/g, activity index 1.48 alpha/mg/hr, He index 110; femic minerals, 38 x 10^{-5} cc.He/g, 56 x 10^{-13} g.Ra/g, 42 x 10^{-6} g.Th/g, activity index 9.53 alpha/mg/hr, He index 122; additional results from minerals tested: quartz, finely powdered and standing 2 mos. before testing, 5.8 x 10^{-5} cc.He/g, He index 120, no other information given; quartz, separated from freshly broken portions of rock and ground to less than 200 mesh, 3.9 x 10^{-5} cc.He/g, activity index 1.58 alpha/mg/hr, He index 76; same ground quartz, after standing 1 day, being pumped at high vacuum for 3 days, and left at high vacuum for 7 more days, 3.1 x 10^{-5} cc.He/g, He index 60, no other information given: 802;
granite from same quarried block as ground specimen tested one year after collection, 6.71 x 10^{-5} cc.He/g, activity index 2.78 alpha/mg/hr, He index 74; tests on minerals from this granite gave: feldspar, 1.04 x 10^{-5} cc.He/g, activity index 0.72 alpha/mg/hr, He index 44; quartz 2.88 x 10^{-5} cc.He/g, activity index 0.97 alpha/mg/hr, He index 91; femic minerals,

MASSACHUSETTS (contd.)

Essex County (contd.)
Radioactive Rocks
Cape Ann
Rockport
Upper Pigeon Hill quarry:
74 x 10^{-5} cc.He/g, activity index 12 alpha/mg/hr, He index 189: 802;
portion of same granite specimen, ground and resampled, activity index 1.40 alpha/mg/hr, only value given: 802;
average values for minerals in and for the Cape Ann granite itself would be: quartz, 4.1 x 10^{-5} cc.He/g, 8.0 x 10^{-13} g. Ra/g, 5.75 x 10^{-6} g.Th/g, Th/U ratio 2.5, activity index 1.34 alpha/mg/hr, He index 94; feldspar, 1.5 x 10^{-5} cc.He/g, 4.9 x 10^{-13} g.Ra/g, 3.1 x 10^{-6} g.Th/g, Th/U ratio 2.2, activity index 0.78 alpha/mg/hr, He index 59; femic minerals, 56 x 10^{-5} cc. He/g, 64 x 10^{-13} g.Ra/g, 48 x 10^{-6} g.Th/g, Th/U ratio 2.5, activity index 10.8 alpha/mg/hr, He index 159; granite itself, 9.7 x 10^{-5} cc.He/g, 17.8 x 10^{-13} g.Ra/g, 17.1 x 10^{-6} g.Th/g, Th/U ratio 3.4, activity index 3.35 alpha/mg/hr, He index 89; weighted values for granite based on helium and radioactivity contents of individual minerals and taking average composition of granulated samples as 32.5% quartz, 62% feldspar, and 5.5% femic minerals: 5.8 x 10^{-5} cc.He/g, 9.2 x 10^{-13} g. Ra/g, 6.4 x 10^{-6} g.Th/g, Th/U ratio 2.5, activity index 1.52, He index 115; discrepancies between experimental and calculated values for granite probably caused by inhomogeneities, which might be corrected by testing more representative samples of the minerals, or detecting presence of more active minor constituents that contribute in an undetermined

MASSACHUSETTS (contd.)

Essex County (contd.)
Radioactive Rocks
Cape Ann
Rockport
Upper Pigeon Hill quarry:
way to helium content and radioactivity of the rock: 802; distribution of radioactive elements in Essex County granite: feldspar, Th/U ratio 2.2, activity index 0.78 alpha/mg/hr., relative radioactivity 1.0, radioactivity 14.5%; quartz, Th/U ratio 2.2, activity index 1.34 alpha/mg/hr., relative radioactivity (cf. feldspar) 1.7, radioactivity 13%; biotite and hornblende (55%), Th/U ratio 2.6, activity index 17.5 alpha/mg/hr., relative radioactivity (cf. feldspar) 22.5, radioactivity 38%; allanite, zircon (trace), calculated Th/U ratio 4, calculated radioactivity 35.5%; granite, Th/U ratio 3.2, activity index 3.30 alpha/mg/hr., relative radioactivity (cf. feldspar) 4.2, radioactivity 100%; xenolith, Th/U ratio 4.0, activity index 3.96 alpha/mg/hr., relative radioactivity (cf. feldspar) 5.1:802;
comparison of ratios of He index of comparable parts of Cape Ann or Essex and Quincy granites gave: granite 1.5, quartz 1.4, feldspar 1.1, and femics 2.0, suggesting that Essex granite on Cape Ann is older, probably Devonian in age, like the coastal granites to the north, while Quincy granite is probably Carboniferous in age: 802;
methods used in making radioactivity determinations: 802.
Chelmsford: radioactivity determinations on samples of Chelmsford granite and Chelmsford granite pegmatite gave respectively 17.4 and 0.787×10^{-5} cc.He/g, 53.0 and 6.1×10^{-13} g.Ra/g, 26.2 and 1.9×10^{-6} g.Th/g, age 63 $\pm$ 6 and 30 $\pm$ 3 (?) m.y.: 746.

MASSACHUSETTS (contd.)

Essex County (contd.)
Radioactive Rocks
Rowley from road at Newburyport Turnpike and Crowley street: gray tuff probably of lower Devonian or upper Silurian age, overlain by glacial till and underlain by fossiliferous shale, mean value of radioactivity $0.57 \pm 0.04 \times 10^{-12}$ g.Ra/g.rock: 745.
Thorite Occurrences
Andrews Point: pegmatites associated with alkalic granites of Cape Ann include the following in their mineral content; cyrtolite, allanite, fergusonite, yttrocerite, tantalite, thorite, gadolinite, but many of them are so rare that they are difficult to find and obviously have no economic value: 672.
Babson Farm quarry: pegmatites associated with alkalic granites of Cape Ann include the following in their mineral content; cyrtolite, allanite, fergusonite, yttrocerite, tantalite, thorite, gadolinite, but many of them are so rare that they are difficult to find and obviously have no economic value: 672.
Briar Neck near Gloucester: pegmatites associated with alkalic granites of Cape Ann include the following in their mineral content; cyrtolite, allanite, fergusonite, yttrocerite, tantalite, thorite, gadolinite, but many of them are so rare that they are difficult to find and obviously have no economic value: 672.
Cape Ann: pegmatites contained, among other minerals, cyrtolite, allanite, fergusonite, yttrocerite, tantalite, thorite, gadolinite but no tourmaline: 1100.

MASSACHUSETTS (contd.)

Essex County (contd.)

Thorite Occurrences

Cape Ann

Cape Ann granite: pegmatites in the granite are similar in rare mineral content at Quincy, Cape Ann and Rockport, Massachusetts, and Baringer Hill, Texas, although the occurrences also present some striking differences: 1006; rare minerals present in the pegmatites of Cape Ann granite include: allanite, cyrtolite, fergusonite, gadolinite, thorite, and yttrocerite; cyrtolite occurs as small groups of brown crystals with curved faces and usually associated with white quartz and granular black chlorite, thorite as the variety orangite, associated with fluorite, fergusonite as small irregular grains and narrow lens-shaped plates in feldspar and in graphic granite and gadolinite in "strained zone" in quartz; at Rockport yttrocerite is reported on massive quartz: 1006.

Rockport

Rockport quarry: pegmatites associated with alkalic granites of Cape Ann include the following in their mineral content; cyrtolite, allanite, fergusonite, yttrocerite, tantalite, thorite, gadolinite, but many of them are so rare that they are difficult to find and obviously have no economic value: 672.

Thorium Occurrences

Andrews Point: pegmatites associated with alkalic granites of Cape Ann include the following in their mineral content; cyrtolite, allanite, fergusonite, yttrocerite, tantalite, thorite, gadolinite, but many of them are so rare that they are difficult to find and obviously have no economic value: 672.

MASSACHUSETTS (contd.)

Essex County (contd.)

Thorium Occurrences

Babson Farm quarry: pegmatites associated with alkalic granites of Cape Ann include the following in their mineral content; cyrtolite, allanite, fergusonite, yttrocerite, tantalite, thorite, gadolinite, but many of them are so rare that they are difficult to find and obviously have no economic value: 672.

Briar Neck near Gloucester: pegmatites associated with alkalic granites of Cape Ann include the following in their mineral content; cyrtolite, allanite, fergusonite, yttrocerite, tantalite, thorite, gadolinite, but many of them are so rare that they are difficult to find and obviously have no economic value: 672.

Cape Ann: pegmatites contained, among other minerals, cyrtolite, allanite, fergusonite, yttrocerite, tantalite, thorite, gadolinite but no tourmaline: 1100; allanite as an accessory mineral in biotite-bearing hornblende-granite in occasional anhedrons, irregularly shaped and chestnut-brown in color with strong pleochroism: 727; thorium-uranium ratio of Paleozoic granitic type rock, 3.7; radioactivity of 5.17×10^{-6} g. U/g. rock and 19.3×10^{-6} g. Th/g. rock: 800.

General: all Quincy granite on Cape Ann estimated to contain 0.003% eU: 793.

Cape Ann granite: allanite as rare accessory mineral in granite: 1006; rare minerals present in the pegmatites of Cape Ann granite include: allanite, cyrtolite, fergusonite, gadolinite, thorite, and yttrocerite; cyrtolite occurs as small groups of brown crystals with curved faces and usually associated with white quartz

MASSACHUSETTS (contd.)

Essex County (contd.)
Thorium Occurrences
Cape Ann
Cape Ann granite:
and granular black chlorite, thorite as the variety, orangite, associated with fluorite, fergusonite as small irregular grains and narrow lens-shaped plates in feldspar and in graphic granite, and gadolinite in "strained zone" in quartz; at Rockport yttrocerite is reported on massive quartz: 1006; pegmatites in the granite are similar in rare mineral content at Quincy, Cape Ann and Rockport, Massachusetts, and Baringer Hill, Texas, although the occurrences also present some striking differences: 1006.
Johnson Quarry: helium and radioactivity data for alkali granite, 10.0×10^{-5} cc. He/g., 17.8×10^{-13} g. Ra/g., 17.1×10^{-6} g. Th/g., and activity 3.35 alpha /mg./hr.: 803; helium and radioactivity data for cognate xenolith, 10.8×10^{-5} cc. He/g., 19.5×10^{-13} g. Ra/g., 22.2×10^{-6} g. Th/g., and activity 3.99 alpha /mg./hr.: 803; helium and radioactivity data for feldspar, 1.6×10^{-5} cc. He/g., 4.9×10^{-13} g. Ra/g., 3.1×10^{-6} g. Th/g., and activity 0.75 alpha /mg/hr.: 803; helium and radioactivity data for mafics, 5.8×10^{-5} cc. He/g., 64×10^{-13} g. Ra/g., 48×10^{-6} g. Th/g., and activity 10.8 alphas/mg./hr.: 803; helium and radioactivity data for quartz, 4.9×10^{-5} cc. He/g., 8.0×10^{-13} g. Ra/g., 5.75×10^{-6} g. Th/g., and activity 1.34 alpha /mg./hr.: 803.

MASSACHUSETTS (contd.)

Essex County (contd.)
Thorium Occurrences
Cape Ann
Rockport: cyrtolite: 834; cyrtolite, fergusonite: 1098; fergusonite in granite: 653; minerals reported at both this area and Baringer Hill include: allanite, cyrtolite, fergusonite, magnetite, smoky quartz, gadolinite; yttrocerite reported here: 1006; pegmatites in the granite are similar in rare mineral content at Quincy, Cape Ann, and Rockport, Massachusetts, and Baringer Hill, Texas, although the occurrences also present some striking differences: 1006; olive-green granites stained by limonite in rift cracks and around opaque minerals; also contains biotite and allanite: 715.
Bay View dark-granite prospect, opened by Rockport Granite Co., between Blood Ledge quarry and the "Deep Pit" near Bay View: allanite, magnetite, and zircon, somewhat abundant as accessory minerals in the dark brownish gray riebeckite-aegirite-biotite granite: 715; allanite as an accessory mineral, somewhat abundant, in granite: 716.
Blood Ledge quarry 3/5 mi. ENE of Bay View and 2 mi. NW of Rockport: allanite as an accessory mineral in "Rockport sea-green" granite with some of limonite proceeding radially from allanite particles: 716; allanite as an accessory mineral in the "Bay View green", a hornblende granite of dark-olive gray color: 715.

MASSACHUSETTS (contd.)

Essex County (contd.)
Thorium Occurrences
Cape Ann
Rockport
Cheves Green Granite quarry 1 3/4 mi. NW of Rockport: allanite as an accessory mineral mostly enclosed in the hornblende particles in "green granite" with some limonite staining proceeding radially from the allanite: 716; allanite, mostly within hornblende particles, as an accessory mineral in the "green granite": 715.
"Deep Pit" about 1/5 mi. from tidewater at Bay View, on W side of the Cape, operated by Rockport Granite Co.: allanite as an accessory mineral in the "Bay View gray", a medium-gray hornblende granite: 715; allanite as an accessory mineral in "Bay View gray" granite: 716.
Devils Rock quarry, ½ mi. SE of Lanesville, operated by William R. Cheves: allanite as an accessory mineral in medium-gray hornblende granite: 715; allanite as an accessory mineral in a gray hornblende granite: 716.
Nickerson quarries ¼ mi. SE of Folly Cove: allanite as an accessory mineral in medium-gray hornblende granite: 715.
Pigeon Hill quarry at S foot of Pigeon Hill, operated by the Pigeon Hill Granite Co.: allanite as an accessory in the medium-gray hornblende granite: 715.
Pigeon Hill quarry (lower) at S foot of Pigeon Hill about 1 mi. NNW of Rockport: allanite as an accessory mineral in "Rockport light gray" granite: 716.
Rockport "gray granite": allanite as an accessory mineral: 715.
Rockport "green granite": allanite as an accessory mineral: 715.

MASSACHUSETTS (contd.)

Essex County (contd.)
Thorium Occurrences
Cape Ann
Rockport
Rockport quarry: pegmatites associated with alkalic granites of Cape Ann include the following in their mineral content: cyrtolite, allanite, fergusonite, yttrocerite, tantalite, thorite, gadolinite, but many of them are so rare that they are difficult to find and obviously have no economic value: 672.
Upper Pigeon Hill quarry, 1/3 mi. SW of Pigeon Hill, operated by Pigeon Hill Granite Co.: allanite as an accessory in the medium-gray hornblende granite, like the Pigeon Hill quarry: 715; Rockport granite, possibly pre-Triassic and post-Cambrian in age, radioactivity $2.3 \pm 0.3 \times 10^{-12}$ g.Ra/g.rock (mean value), $5.1 \pm 1.0 \times 10^{-6}$ g.U/g.rock, $2.6 \pm 0.5 \times 10^{-6}$ g.Th/g.rock, and Th/U ratio 0.5; Rockport xenolith, radioactivity $1.80 \pm 0.06 \times 10^{-12}$ g.Ra/g.rock, $6.5 \pm 0.9 \times 10^{-6}$ g.U/g.rock, $17 \pm 4.0 \times 10^{-6}$ g.Th/g., and Th/U ratio 2.6: 745.
Den quarry on Peabody and Lynn town line, 2 3/4 mi. NNW of Lynn station: allanite as an accessory mineral and as inclusions in black hornblende and augite in "Peabody green" granite, with limonite staining coming from allanite and augite : 716.
Eastern Point from quarry near Lighthouse: allanite in granite: 1008.
Linehan quarry in Peabody on a knoll ¼ mi. E of Bartholomew Pond: allanite as an accessory mineral in "Peabody green" granite: 716.

MASSACHUSETTS (contd.)

Essex County (contd.)

Thorium Occurrences

Lynnfield: allanite in granite: 787.

Marblehead Neck: allanite in granite: 1008.

Peabody stock: dark reddish brown mineral, possibly allanite, in granite: 701.

Pigeon Cove: radioactivity determinations on grab samples of Quincy dark hornblende granite of early Carboniferous age: 0.003% eU, 0.0004% U, and 0.001% ThO_2: 793.

Robin Rock quarry in Lynnfield 4/5 mi. SSW of South Lynnfield station: allanite as an accessory mineral and as inclusion in hornblende in "Robin Rock green" granite: 716.

Swampscott: allanite in granite, first reported here in 1862: 1008.

Swampscott Beach near Clifton House: orthite embedded in quartz and, sometimes, in feldspar too; mineralogy: 643.

Uranium Occurrences

Andrews Point: pegmatites associated with alkalic granites of Cape Ann include the following in their mineral content; cyrtolite, allanite, fergusonite, yttrocerite, tantalite, thorite, gadolinite, but many of them are so rare that they are difficult to find and obviously have no economic value: 672.

Babson Farm quarry: pegmatites associated with alkalic granites of Cape Ann include the following in their mineral content; cyrtolite, allanite, fergusonite, yttrocerite, tantalite, thorite, gadolinite, but many of them are so rare that they are difficult to find and obviously have no economic value: 672.

MASSACHUSETTS (contd.)

Essex County (contd.)

Uranium Occurrences

Briar Neck near Gloucester: pegmatites associated with alkalic granites of Cape Ann include the following in their mineral content; cyrtolite, allanite, fergusonite, yttrocerite, tantalite, thorite, gadolinite, but many of them are so rare that they are difficult to find and obviously have no economic value: 672.

Cape Ann: pegmatites contained, among other minerals, cyrtolite, allanite, fergusonite, yttrocerite, tantalite, thorite, gadolinite but no tourmaline: 1100; thorium-uranium ratio of Paleozoic granitic type rock, 3.7; radioactivity of 5.17×10^{-6} g. U/g. rock and 19.3×10^{-6} g. Th/g. rock: 800.

General: all Quincy granite on Cape Ann estimated to contain 0.003% eU: 793.

Cape Ann granite: rare minerals present in the pegmatites of Cape Ann granite include: allanite, cyrtolite, fergusonite, gadolinite, thorite, and yttrocerite; cyrtolite occurs as small groups of brown crystals with curved faces and usually associated with white quartz and granular black chlorite, thorite as the variety, orangite, associated with fluorite, fergusonite as small irregular grains and narrow lens-shaped plates in feldspar and in graphic granite, and gadolinite in "strained zone" in quartz; at Rockport yttrocerite is reported on massive quartz: 1006;

MASSACHUSETTS (contd.)

Essex County (contd.)
Uranium Occurrences
Cape Ann
Cape Ann granite: pegmatites in the granite are similar in rare mineral content at Quincy, Cape Ann, and Rockport, Massachusetts, and Baringer Hill, Texas, although the occurrences also present some striking differences: 1006.
Rockport: cyrtolite: 834; cyrtolite, fergusonite: 1098; fergusonite in granite: 653; minerals reported at both this area and Baringer Hill include: allanite, cyrtolite, fergusonite, magnetite, smoky quartz, gadolinite; yttrocerite reported here: 1006; pegmatites in the granite are similar in rare mineral content at Quincy, Cape Ann, and Rockport, Massachusetts, and Baringer Hill, Texas, although the occurrences also present some striking differences: 1006.
Rockport quarry: pegmatites associated with alkalic granites of Cape Ann include the following in their mineral content; cyrtolite, allanite, fergusonite, yttrocerite, tantalite, thorite, gadolinite, but many of them are so rare that they are difficult to find and obviously have no economic value: 672.
Upper Pigeon Hill quarry: Rockport granite, possibly pre-Triassic and post-Cambrian in age, radioactivity 2.3 +/- 0.3 x 10^{-12} g.Ra/g.rock (mean value), 5.1 +/- 1.0 x 10^{-6} g.U/g.rock, 2.6 +/- 0.5 x 10^{-6} g.Th/g.rock, and Th/U ratio 0.5; Rockport xenolith, radioactivity 1.80 +/- 0.06 x 10^{-12} g.Ra/g.rock, 6.5 +/- 0.9 x 10^{-6} g.U/g.rock, 17 +/- 4.0 x 10^{-6} g.Th/g, and Th/U ratio 2.6: 745.

MASSACHUSETTS (contd.)

Essex County (contd.)
Uranium Occurrences
Cape Ann
Pigeon Cove: radioactivity determinations on grab samples of Quincy dark hornblende granite of early Carboniferous age: 0.003% eU, 0.0004% U, and 0.001% ThO_2: 793.
Yttrocerite Occurrences
Andrews Point: pegmatites associated with alkalic granites of Cape Ann include the following in their mineral content; cyrtolite, allanite, fergusonite, yttrocerite, tantalite, thorite, gadolinite, but many of them are so rare that they are difficult to find and obviously have no economic value: 672.
Babson Farm quarry: pegmatites associated with alkalic granites of Cape Ann include the following in their mineral content; cyrtolite, allanite, fergusonite, yttrocerite, tantalite, thorite, gadolinite, but many of them are so rare that they are difficult to find and obviously have no economic value: 672.
Briar Neck near Gloucester: pegmatites associated with alkalic granites of Cape Ann include the following in their mineral content; cyrtolite, allanite, fergusonite, yttrocerite, tantalite, thorite, gadolinite, but many of them are so rare that they are difficult to find and obviously have no economic value: 672.
Cape Ann
Cape Ann granite: rare minerals present in the pegmatites of Cape Ann granite include: allanite, cyrtolite, fergusonite, gadolinite, thorite, and yttrocerite; cyrtolite occurs as small groups of brown crystals with curved faces and usually associated with white quartz

Essex County (contd.)
Yttrocerite Occurrences
Cape Ann
Cape Ann granite:
and granular black chlorite, thorite as the variety, orangite, associated with fluorite, fergusonite as small irregular grains and narrow lens-shaped plates in feldspar and in graphic granite, and gadolinite in "strained zone" in quartz; at Rockport yttrocerite is reported on massive quartz: 1006; pegmatites in the granite are similar in rare mineral content at Quincy, Cape Ann, and Rockport, Massachusetts, and Baringer Hill, Texas, although the occurrences also present some striking differences: 1006.
Rockport: minerals reported at both this area and Baringer Hill include: allanite, cyrtolite, fergusonite, magnetite, smoky quartz, gadolinite; yttrocerite reported here: 1006; pegmatites in the granite are similar in rare mineral content at Quincy, Cape Ann, and Rockport, Massachusetts, and Baringer Hill, Texas, although the occurrences also present some striking differences: 1006.
Rockport quarry: pegmatites associated with alkalic granites of Cape Ann include the following in their mineral content; cyrtolite, allanite, fergusonite, yttrocerite, tantalite, thorite, gadolinite, but many of them are so rare that they are difficult to find and obviously have no economic value: 672.

Fergusonite Occurrences
See under individual county names and under Index III, Fergusonite Occurrences-Massachusetts: 653, 672, 1006, 1098.

Franklin County
Allanite Occurrences
Buckland: allanite on a hilltop south of Harris' soapstone quarry superficially decomposed to a red substance: 738.
Monazite Occurrences
South Orange: monazite: 950.
Thorium Occurrences
Buckland: allanite on a hilltop south of Harris' soapstone quarry superficially decomposed to a red substance: 738.
South Orange: monazite: 950.

Gadolinite Occurrences
See under individual county names and under Index III, Thorium Occurrences-Massachusetts: 672, 924, 950, 1006, 1100.

Geophysical Exploration (Ground)
See under individual county names and under Index III, Geophysical Exploration (Ground)-Massachusetts: 793.

Hampden County
Allanite Occurrences
Flynt quarries on SW side of Bunyan Mountain, 1¼ mi. NNW of Monson station: allanite as an accessory mineral in Monson granodiorite: 716.
Monson: allanite as a very rare accessory mineral in Monson granodiorite in quarry: 739.
Wilabraham: allanite intergrown with some of the abundant epidote grains in rock essentially identical with Monson granodiorite: 739.
Radioactive Rocks
Brimfield: radioactivity determinations on rusty-colored soil derived from Brimfield schist of Carboniferous age: 0.002% eU; no determinations made for U or ThO_2 content: 793.

MASSACHUSETTS (contd.)

Hampden County (contd.)

Thorium Occurrences

Flynt quarries on SW side of Bunyan Mountain, 1¼ mi. NNW of Monson station: allanite as an accessory mineral in Monson granodiorite: 716.

Monson: allanite as a very rare accessory mineral in Monson granodiorite in quarry: 739.

Wilabraham: allanite intergrown with some of the abundant epidote grains in rock essentially identical with Monson granodiorite: 739.

(See also Berkshire-Hampden Cos.: 715)

(See also Hampden-Hampshire Cos.: 672)

Hampden & Hampshire Counties

Autunite Occurrences

Western belt of pegmatites extending from Blandford to Goshen: pegmatites occur at many localities in area and in some of them not named specifically, the following are included in the mineral content, microlite, cyrtolite, autunite, and torbernite: 672.

Cyrtolite Occurrences

Western belt of pegmatites extending from Blandford to Goshen: pegmatites occur at many localities in area and in some of them, not named specifically, the following are included in the mineral content, microlite, cyrtolite, autunite, and torbernite: 672.

Microlite Occurrences

Western belt of pegmatites extending from Blandford to Goshen: pegmatites occur at many localities in area and in some of them, not named specifically, the following are included in the mineral content, microlite, cyrtolite, autunite, and torbernite: 672.

MASSACHUSETTS (contd.)

Hampden & Hampshire Counties (contd.)

Thorium Occurrences

Western belt of pegmatites extending from Blandford to Goshen: pegmatites occur at many localities in area and in some of them, not named specifically, the following are included in the mineral content, microlite, cyrtolite, autunite, and torbernite: 672.

Torbernite Occurrences

Western belt of pegmatites extending from Blandford to Goshen: pegmatites occur at many localities in area and in some of them, not named specifically, the following are included in the mineral content, microlite, cyrtolite, autunite, and torbernite: 672.

Uranium Occurrences

Western belt of pegmatites extending from Blandford to Goshen: pegmatites occur at many localities in area and in some of them, not named specifically, the following are included in the mineral content, microlite, cyrtolite, autunite, and torbernite: 672.

Hampshire County

Allanite Occurrences

Belchertown: allanite: 1098.

Gilbertville near Ware: allanite in crystals, with flattened prisms 2 inches long and one-half inch wide, in coarse granite: 738.

Greenwich (under Quabbin Reservoir): chemical analyses of allanite gave 0.095% U, and 1.530% Th, and an age of 390 m.y.: 925.

Greenwich, W base of hill ¼ mi. E of (under Quabbin Reservoir now): in pegmatite lens: 849.

MASSACHUSETTS (contd.)

Hampshire County (contd.)

Allanite Occurrences

Hatfield: allanite as a constant accessory of Hatfield tonalite: 738.

Pelham: allanite abundant in granular anorthite of Pelham asbestos quarry, mineralogical characteristics; allanite also occurs in Pelham gneiss: 738.

Pelham, asbestos mine at: allanite, rutile, tourmaline as large masses in anorthitic zone between olivine-enstatite dike and gneiss; allanite caused some puckering around one corundum crystal and in massive anorthite: 740.

Quabbin Aqueduct: allanite in small grains in granite wall rock: 944.

Quabbin Reservoir area in quarry E of baffle dam: allanite, surrounded by radial cracks, in pegmatite; rock to be tested for age determinations: 645.

Ward quarry in Pelham township 2 mi. NE of West Pelham and 4 mi. ENE of Amherst: allanite as an accessory mineral in Pelham granite: 716.

Ware: allanite: 738.

Ware Center, quarry about 1 mile south of: allanite in pegmatite veins: 645.

Western Highlands in a quarry on W side of main highway between Northampton and Hatfield: granodiorite mass contains allanite crystals, surrounded by a halo, pitch-black in color, and large enough to be seen by naked eye and to be concentrated either mechanically or by sorting crushed rock under a binocular microscope; specimens examined contained one crystal per sq. inch of exposed surface, although this average may be high, and the crystals were 1 mm. thick and 7 mm. long; allanite seems to occur only in main granodiorite rock mass of quarry being found rarely in a complex section, cut by shear zones, etc. in the NW corner of the quarry: 641.

MASSACHUSETTS (contd.)

Hampshire County (contd.)

Age Determinations

Norwich: metamict zircon gave a probable geologic age of 250 +- 50 m.y. and an activity of 100 +- 5 alphas/mg/min.: 821.

Autunite Occurrences

Chesterfield: autunite; fluorescence test with monochromator: 963; autunite with columbite and other rare accessory minerals: 1098; autunite in minute crystals on quartz or albite and sometimes in red centers of tourmalines, uranite in tourmaline, microlite or pyrochlore shown by analysis to contain uranium uranochre: 738.

Chesterfield Hollow: pegmatite with autunite, microlite: 1100; torbernite associated with spodumene and resulting from change of zircons containing uranium, uranochre in fissures in spodumene resulting from change of autunite and torbernite: 738; zircon, rich in uranium, in minute double pyramids, rarely 3/16 in. in diameter in albitic granite: 797; zircon absorbed some meteoric water and lost part of its uranium, which separated as autunite, torbernite, and uranochre: 797.

West Chesterfield: autunite on cleavage planes of spodumene, derived from alteration of zircon containing uranium: 738.

Cyrtolite Occurrences

Huntington

Walnut Hill: cyrtolite in albitic granite in central quartz core of vein: 738; very coarse albitic granite in secondary pegmatite vein contains cyrtolite, beryl, and spodumene among its minerals: 739; cyrtolite among minerals found in main granite vein: 797.

MASSACHUSETTS (contd.)

Hampshire County (contd.)

Microlite Occurrences

Chesterfield: autunite in minute crystals on quartz or albite and sometimes in red centers of tourmalines, uranite in tourmaline, microlite or pyrochlore shown by analysis to contain uranium, uranochre: 738; microlite, a new mineral species, occurring in albite and, rarely, in tourmaline: 954; microlite in tantalite-bearing albite granite; mineralogy: 671; microlite in very minute crystals in a vein of albite with tourmaline; uranite with albite: 662; microlite, uranite, uranochre: 950; microlite with tourmaline, spodumene, columbite, and cassiterite: 654; microlite; chemical analysis gave 75.70 columbic acid, and, approximately, 14.84 lime, 2.04 moisture, and 7.42 for the tungstic acid, yttria, and protoxide of uranium content; method used: 952; mineral reported here by Shepard as microlite; chemical analysis by Hayes showed 11.8 as combined content of oxides of tin, iron, cerium and uranium while for pyrochlore, chemical analysis by Wohler showed 5.18 U oxide, 2.16 iron oxide, 6.80 cerium oxide and 0.61 tin oxide, leading Teschemacher to believe they are the same mineral: 982; discussion of mineral, reported at this locality as microlite by Shepard and pyrochlore by Teschemacher, as to chemical composition, and physical and optical properties to determine which mineral it is; uranite, claimed to have been discovered here by Shepard before Teschemacher: 957; mineral called microlite by Shepard and pyrochlore by Teschemacher said to be the same; uranite also claimed to have been found here first by Teschemacher, who reported it at a meeting in April, 1841, while report of its discovery by Shepard did not appear until November, 1841:981.

MASSACHUSETTS (contd.)

Hampshire County (contd.)

Microlite Occurrences

Chesterfield

Clarke (or Clark's) Ledge: pegmatite vein contains small quantities of the rarer minerals like microlite, columbite, zircon, all increasing in quantity and development toward the center of the vein which is filled with smoky quartz: 739; microlite among minerals found in main granite vein: 797.

Chesterfield Hollow: pegmatite with autunite, microlite: 1100.

Pyrochlore Occurrences

Chesterfield: autunite in minute crystals on quartz or albite and sometimes in red centers of tourmalines, uranite in tourmaline, microlite or pyrochlore shown by analysis to contain uranium, uranochre: 738; discussion of mineral, reported at this locality as microlite by Shepard and pyrochlore by Teschemacher, as to chemical composition, and physical and optical properties to determine which mineral it is; uranite claimed to have been discovered here by Shepard before Teschemacher: 957; mineral called microlite by Shepard and pyrochlore by Teschemacher said to be the same; uranite also claimed to have been found here first by Teschemacher, who reported it at a meeting in April, 1841 while report of its discovery by Shepard did not appear until November, 1841: 981.

MASSACHUSETTS (contd.)

Hampshire County (contd.)

Thorium Occurrences

Belchertown: allanite: 1098.

Chesterfield: microlite, a new mineral species, occurring in albite and, rarely, in tourmaline: 954; microlite in tantalite-bearing albite granite; mineralogy: 671; microlite in very minute crystals in a vein of albite with tourmaline; uranite with albite: 662; microlite with tourmaline, spodumene, columbite, and cassiterite: 654; microlite, uranite, uranochre: 950; mineral called microlite by Shepard and pyrochlore by Teschemacher said to be the same; uranite also claimed to have been found here first by Teschemacher, who reported it at a meeting in April, 1841, while report of its discovery by Shepard did not appear until November, 1841: 981; discussion of mineral, reported at this locality as microlite by Shepard and pyrochlore by Teschemacher, as to chemical composition, and physical and optical properties to determine which mineral it is; uranite, claimed to have been discovered here by Shepard before Teschemacher: 957; mineral reported here by Shepard as microlite; chemical analysis by Hayes showed 11.8 as combined content of oxides of tin, iron, cerium, and uranium while for pyrochlore, chemical analysis by Wohler showed 5.18 U oxide, 2.16 iron oxide, 6.80 cerium oxide and 0.61 tin oxide, leading Teschemacher to believe they are the same mineral: 982.

Clarke (or Clark's) Ledge: microlite among minerals found in main granite vein: 797; pegmatite vein contains small quantities of the rarer minerals like microlite, columbite, zircon, all increasing in quantity and development toward the center of the vein which is filled with smoky quartz: 739.

MASSACHUSETTS (contd.)

Hampshire County (contd.)

Thorium Occurrences

Chesterfield Hollow: pegmatite with autunite, microlite: 1100.

Gilbertville near Ware: allanite in crystals, with flattened prisms 2 inches long and one-half inch wide, in coarse granite: 738.

Greenwich (under Quabbin Reservoir): chemical analyses of allanite gave 0.095% U, and 1.530% Th, and an age of 390 m.y.: 925.

Greenwich, W base of hill ¼ mi. E of (under Quabbin reservoir now): allanite in pegmatite lens: 849.

Hatfield: allanite as constant accessory of Hatfield tonalite: 738.

Huntington

Walnut Hill: cyrtolite in albitic granite in central quartz core of vein: 738; very coarse albitic granite in secondary pegmatite veins contains cyrtolite, beryl, and spodumene among its minerals: 739.

Pelham: allanite abundant in granular anorthite of Pelham asbestos quarry, mineralogical characteristics; allanite also occurs in Pelham gneiss: 738.

Pelham, asbestos mine at: allanite, rutile, tourmaline as large masses in anorthitic zone between olivine-enstatite dike and gneiss; allanite caused some puckering around one corundum crystal and in massive anorthite: 740.

Quabbin Aqueduct: allanite in small grains in granite wall rock: 944.

Quabbin Reservoir area in quarry E of baffle dam: allanite, surrounded by radial cracks, in pegmatite; rock to be tested for age determinations: 645.

MASSACHUSETTS (contd.)

Hampshire County (contd.)

Thorium Occurrences

Ward quarry in Pelham township 2 mi. NE of West Pelham and 4 mi. ENE of Amherst: allanite as an accessory mineral in Pelham granite: 716.

Ware: allanite: 738.

Ware Center, quarry about 1 mile south of: allanite in pegmatite veins: 645.

Western Highlands in a quarry on W side of main highway between Northampton and Hatfield: granodiorite mass contains allanite crystals, surrounded by a halo, pitch-black in color, and large enough to be seen by naked eye and to be concentrated either mechanically or by sorting crushed rock under a binocular microscope; specimens examined contained one crystal per sq. inch of exposed surface, although this average may be high, and the crystals were 1 mm. thick and 7 mm. long; allanite seems to occur only in main granodiorite rock mass of quarry being found rarely in a complex section, cut by shear zones, etc, in the NW corner of the quarry: 641.

Torbernite Occurrences

Chesterfield Hollow: torbernite associated with spodumeme and resulting from change of zircons containing uranium, uranochre in fissures in spodumene resulting from change of autunite and torbernite: 738; zircon, rich in uranium, in minute double pyramids, rarely 3/16 in. in diameter in albitic granite: 797; zircon absorbed some meteoric water and lost part of its uranium, which separated as autunite, torbernite, and uranochre: 797.

Uranite Occurrences

Chesterfield: autunite in minute crystals on quartz or albite and sometimes in red centers of tourmalines, uranite in tourmaline, microlite or pyrochlore shown by analysis to contain uranium, uranochre: 738;

MASSACHUSETTS (contd.)

Hampshire County (contd.)

Uranite Occurrences

Chesterfield: microlite, uranite, uranochre: 950; microlite in very minute crystals in a vein of albite with tourmaline; uranite with albite: 662; mineral called microlite by Shepard and pyrochlore by Teschemacher said to be the same; uranite also claimed to have been found here first by Teschemacher, who reported it at a meeting in April, 1841, while report of its discovery by Shepard did not appear until November, 1841: 981; discussion of mineral, reported at this locality as microlite by Shepard and pyrochlore by Teschemacher, as to chemical composition, and physical and optical properties to determine which mineral it is; uranite, claimed to have been discovered here by Shepard before Teschemacher: 957.

Uranium Occurrences

Chesterfield: autunite with columbite and other rare accessory minerals: 1098; autunite; fluorescence test with monochromator: 963; autunite in minute crystals on quartz or albite and sometimes in red centers of tourmalines, uranite in tourmaline, microlite or pyrochlore shown by analysis to contain uranium, uranochre: 738; microlite, a new mineral species, occurring in albite and, rarely, in tourmaline: 954; microlite in tantalite-bearing albite granite; mineralogy: 671; microlite in very minute crystals in a vein of albite with tourmaline; uranite with albite: 662;

MASSACHUSETTS (contd.)

Hampshire County (contd.)
Uranium Occurrences
Chesterfield: microlite; chemical analysis gave 75.70 columbic acid, and, approximately, 14.84 lime, 2.04 moisture, and 7.42 for the tungstic acid, yttria, and protoxide of uranium content; methods used: 952; microlite, uranite, uranochre: 950; microlite with tourmaline, spodumene, columbite, and cassiterite: 654; mineral called microlite by Shepard and pyrochlore by Teschemacher said to be the same; uranite also claimed to have been found here first by Teschemacher, who reported it at a meeting in April, 1841, while report of its discovery by Shepard did not appear until November, 1841: 981; discussion of mineral, reported at this locality as microlite by Shepard and pyrochlore by Teschemacher, as to chemical composition, and physical and optical properties to determine which mineral it is; uranite, claimed to have been discovered here by Shepard before Teschemacher: 957; mineral reported here by Shepard as microlite; chemical analysis by Hayes showed 11.8 as combined content of oxides of tin, iron, cerium, and uranium while for pyrochlore, chemical analysis by Wohler showed 5.18 U oxide, 2.16 iron oxide, 6.80 cerium oxide, and 0.61 tin oxide, leading Teschemacher to believe they are the same mineral: 982; uranium occurrences said to be similar to those at Acworth beryl locality in New Hampshire: 980; uranium phosphate as minute, yellow crystalline cubic plates occurs in tourmaline: 979.
Clarke(or Clark's) Ledge: microlite among minerals found in main granite vein: 797; pegmatite vein contains small quantities of the rarer minerals like microlite, columbite, zircon, all increasing in quantity and development toward the center of the vein which is filled with smoky quartz: 739.

MASSACHUSETTS (contd.)

Hampshire County (contd.)
Uranium Occurrences
Chesterfield Hollow: pegmatites with autunite, microlite: 1100; irregular mass of coarse albitic granite in a secondary pegmatite vein contains beryl, and also zircon, rich in uranium: 739; torbernite associated with spodumene and resulting from change of zircons containing uranium, uranochre in fissures in spodumene resulting from change of autunite and torbernite: 738; zircon, rich in uranium, in minute double pyramids, rarely 3/16 inch in diameter, in albitic granite: 738, 797; zircon absorbed some meteoric water and lost part of its uranium, which separated as autunite, torbernite, and uranochre: 797.
Greenwich (under Quabbin Reservoir): chemical analyses of allanite gave 0.095% U, and 1.530% Th, and an age of 390 m.y.: 925.
Huntington
Walnut Hill: cyrtolite among minerals found in main granite vein: 797; cyrtolite in albitic granite in central quartz core of vein: 738; very coarse albitic granite in secondary pegmatite vein contains cyrtolite, beryl, and spodumene among its minerals: 739.
West Chesterfield: autunite on cleavage planes of spodumene derived from alteration of zircon containing uranium: 738.
Zircon, Uranium-bearing
Chesterfield Hollow: zircon, rich in uranium, in minute double pyramids, rarely 3/16 inch in diameter, in albitic granite: 738, 797;

MASSACHUSETTS (contd.)

Hampshire County (contd.)

Uranium Occurrences

Zircon, Uranium-bearing

Chesterfield Hollow: zircon absorbed some meteoric water and lost part of its uranium, which separated as autunite, torbernite, and uranochre: 797; irregular mass of coarse albitic granite in a secondary pegmatite vein contains beryl, and also zircon, rich in uranium: 739.

Uranochre Occurrences

Chesterfield: autunite in minute crystals on quartz or albite and sometimes in red centers of tourmalines, uranite in tourmaline, microlite or pyrochlore shown by analysis to contain uranium, uranochre: 738; microlite, uranite, uranochre: 950.

Chesterfield Hollow: zircon, rich in uranium, in minute double pyramids, rarely 3/16 in. in diameter in albitic granite: 797; zircon absorbed some meteoric water and lost part of its uranium, which separated as autunite, torbernite, and uranochre: 797; torbernite associated with spodumene and resulting from change of zircons containing uranium, uranochre in fissures in spodumene resulting from change of autunite and torbernite: 738.

Zircon, Uranium-bearing

Chesterfield Hollow: zircon, rich in uranium, in minute double pyramids, rarely 3/16 inch in diameter, in albitic granite: 738, 797; zircon absorbed some meteoric water and lost part of its uranium, which separated as autunite, torbernite, and uranochre: 797; irregular mass of coarse albitic granite in a secondary pegmatite vein contains beryl, and also zircon, rich in uranium: 739.

(See also Hampden-Hampshire Counties: 672)

MASSACHUSETTS (contd.)

Microlite Occurrences

See under individual county names and under Index III, Microlite Occurrences-Massachusetts: 654, 662, 671, 672, 738, 739, 797, 950, 952, 954, 957, 981, 982, 1100.

Middlesex County

Allanite Occurrences

Blueberry Mountain at Winchester: age determinations on allanite gave two sets of values for the rim and for the core; at the rim, values were 2.154% ThO_2 or 1.893% Th, 0.312% U_3O_8 or 0.0265% U, and age ratio, 0.050; at the core, values were 2.285% ThO_2 or 2.01% Th, 0.0117% U_3O_8 or 0.0099% U, and age ratio, 0.0423: 828.

Hopkinton

Hopkinton quarry, 1 mi. S of Hayden Row and 3 3/4 mi. NNE of Milford, operated by Massachusetts Pink Granite Co.: allanite rimmed with epidote as an accessory mineral in medium, slightly pinkish gray biotite granite: 715, 716.

Maguire quarry, 0.5 mi. W of Echo Lake, operated by Norcross Milford Pink Granite Co: allanite as an accessory mineral in granite, like the Cutting quarry: 715.

Winchester: black platy allanite crystals in pegmatite in a trap rock quarry: 1088.

Woburn

Blueberry Mountain, 9 mi. NNW of Boston: allanite occurs abundantly in quartz and in feldspar and orangite and thorite occur as small crystals scattered throughout the pegmatite; all three minerals produce radial cracks in the matrix; mineralogy: 919;

MASSACHUSETTS (contd.)

Middlesex County (contd.)
Allanite Occurrences
Woburn
Blueberry Mountain, 9 mi. NNW of Boston: orangite, allanite in feldspar matrix: 1072; pegmatites associated with Dedham granodiorite include the following in their mineral content, allanite, orangite, thorite, and cyrtolite: 672; four chemical analyses of allanite gave respectively 0.11, 0.039, 0.0265, and 0.0099% U, 2.013, 1.76 and 1.63, 1.893, and 2.008% Th, and ages of 340, 400 or 430, 400, and 340 m.y.: 925; allanite, average Pb/U ratio 0.043 and geologic age 310 m.y.: 948.
Blueberry Mountain quarry at Woburn: allanite crystals in feldspar and quartz, thorite in tiny reddish-brown crystals, and orangite in small glassy needle-like crystals also found, but rare, with allanite: 735.
Cyrtolite Occurrences
Woburn
Blueberry Mountain, 9 mi. NNW of Boston: pegmatites associated with Dedham granodiorite include the following in their mineral content, allanite, orangite, thorite, and cyrtolite: 672.
Gadolinite Occurrences
Boxborough: gadolinite, questionable occurrence, may be orthite: 924.
Monazite Occurrences
Ayer: monazite in gneiss: 726.
Westford: monazite in gneiss: 726.
Orangite Occurrences
Woburn
Blueberry Mountain 9 mi. NNW of Boston: allanite occurs abundantly in quartz and in feldspar and orangite and thorite occur as small crystals scattered throughout the pegmatite; all three minerals produce radial cracks in the matrix; mineralogy: 919; orangite, allanite in feldspar matrix: 1072;

MASSACHUSETTS (contd.)

Middlesex County (contd.)
Orangite Occurrences
Woburn
Blueberry Mountain, 9 mi. NNW of Boston: pegmatites associated with Dedham granodiorite include the following in their mineral content, allanite, orangite, thorite, and cyrtolite: 672.
Blueberry Mountain quarry: allanite crystals in feldspar and quartz, thorite in tiny reddish-brown crystals, and orangite in small glassy needle-like crystals also found, but rare, with allanite: 735.
Orthite Occurrences
Boxborough: orthite with brown hornblende and spinel: 924; gadolinite, questionable occurrence, may be orthite: 924.
Radioactive Minerals
North Chelmsford
Fletcher quarry: radioactivity studies made on over 20 samples of rock and mineral concentrates of Ayer Chelmsford granite; more than half the activity is due to accessory minerals; zircon, apatite, epidote, and biotite have more than five times the radioactivity of the parent rock: 804; radioactivities and helium data for minerals of the Chelmsford granite-migmatite were as follows, with activity index in alpha/mg/hr: microcline, 0.8×10^{-5} cc He/g., activity index 1.9, He index 13, and He retentivity 0.05; quartz and plagioclase, 1.1×10^{-5} cc. He/g, activity index 1.5, He index 23, and He retentivity 0.09; muscovite, 1.43×10^{-5} cc. He/g, activity index 1.5, He index 29,

MASSACHUSETTS (contd.)

Middlesex County (contd.)
Radioactive Minerals
North Chelsford
Fletcher quarry:
and He retentivity 0.12; biotite, 33.4 x 10^{-5} cc. He/g, activity index 13.1, He index 78, and He retentivity 0.31; magnetic chlorite, 6.6 x 10^{-5} cc. He/g, activity index 11.3, He index 18, and He retentivity 0.07; magnetite, 70 x 10^{-5} cc. He/g, activity index 13; epidote, 320 x 10^{-5} cc. He/g, activity index 213, He index 46, and He retentivity 0.18; garnet, 40.3 x 10^{-5} cc. He/g, activity index 3.58, He index 340, and He retentivity 1.36; apatite, 4260 x 10^{-5} cc. He/g, activity index 710, He index 185, and He retentivity 0.74; zircon, 120000 x 10^{-5} cc He/g, activity index 14,000, He index 260, and He retentivity 1.03; sphene, 248 x 10^{-5} cc. He/g, activity index 8, He index 955, and He retentivity 3.82: 804; comparison of radioactivity of some minerals in Chelmsford granite migmatite and California Lakeview tonalite, in terms of activity index, listed in alpha/mg/hr, gave the following results: Chelmsford: zircon, 14,000; apatite, 710; sphene, 8; epidote, 213; and biotite, 25: 804; comparison of radioactivity of some minerals in Chelmsford granite-migmatite and California Lakeview tonalite, in terms of activity index, listed in alpha/mg/hr, gave the following results: Lakeview: zircon, 401; apatite 56; sphene, 256; epidote, no listing; and biotite, 0.4; the chief differences lie in low activity for sphene and high activity for epidote in the Chelmsford granite-migmatite; the zircon has the highest specific activity found for minerals separated from the normal range of granitic rocks,

MASSACHUSETTS (contd.)

Middlesex County (contd.)
Radioactive Minerals
North Chelmsford
Fletcher quarry:
the 14,000 being equivalent to a Th content of approximately 0.08 g/g. and a Ra content of 7 x 10^{-9} g/g; also the Lakeview tonalite has a radioactivity of only 0.8 alpha/mg/hr and a Ra content of 4.9 x 10^{-13} g. Ra/g. while the Chelmsford granite-migmatite has an activity index 10 times as high and a Ra content of 53 x 10^{-13} g. Ra/g: 804.
Radioactive Rocks
Chelmsford: radioactivity determinations on samples of Chelmsford granite and Chelmsford granite pegmatite gave respectively 17.4 and 0.787 x 10^{-5} cc. He/g, 53.0 and 6.1 x 10^{-13} g. Ra/g, 26.2 and 1.9 x 10^{-6} g. Th/g, age 63 +- 6 and 30 +- 3 (?) m.y.: 746.
General Crush Stone quarry on Blueberry Mountain: gabbro-diorite, mean value of radioactivity 0.16 +- 0.01 x 10^{-12} g. Ra/g. rock 0.45 +- 0.03 x 10^{-6} g. U/g. rock, 1.6 +- 0.3 x 10^{-6} g. Th/g. rock, Th/U ratio, 3.6: 745.
Graniteville in Fletcher quarry: radioactivity determinations on samples of Ayer granite of late- to post-Carboniferous age, known commercially as "Chelmsford granite": 0.007% eU, 0.000% U, and 0.013% ThO_2 for chip sample from quarry face; 0.004% eU and no determinations for U or ThO_2 content in two grab samples of trimming rock and of waste of minus 1/8 inch rock: 793.

MASSACHUSETTS (contd.)

Middlesex County (contd.)
Radioactive Rocks
North Chelmsford
Fletcher, H. E., quarry: Chelmsford granite, possibly Mississippian in age, mean value of radioactivity 2.5 +- 0.1 x 10^{-12} g Ra/g rock: 745.
Fletcher Quarry: helium and radioactivity data for migmatite, 16.8 x 10^{-5} cc He/g., 59 and 46 x 10^{-13} g. Ra/g., or an average of 53 x 10^{-13} g. Ra/g., 26 x 10^{-6} g. Th/g., and average activity 7.82 alpha /mg/hr.: 803; helium and radioactivity data for pegmatite, essentially feldspar, 0.58 x 10^{-5} cc. He/g., 5.9 x 10^{-13} g. Ra/g., 1.9 x 10^{-6} g. Th/g., and activity 0.78 alpha /mg/hr.: 803; radioactivity studies made on over 20 samples of rock and mineral concentrates of Ayer Chelmsford granite; more than half the activity is due to accessory minerals; zircon, apatite, epidote, and biotite have more than five times the radioactivity of the parent rock: 804; radioactivity of the rock itself, with activity index listed in alpha/mg/hr: fine-grained migmatite, 5.55 x 10^{-5} cc. He/g., activity index 6.15, He index 28; medium-grained migmatite, 16.8 x 10^{-5} cc. He/g., activity index 7.82, He index 66; coarse-grained migmatite, 5.73 x 10^{-5} cc. He/g., activity index 5.76, He index 30.5; associated pegmatite, 0.58 x 10^{-5} cc. He/g., activity index 0.78, He index 23: 804; radioactivities and helium data for minerals of the Chelmsford granite-migmatite were as follows, with activity index in alpha/mg/hr: microcline, 0.8 x 10^{-5} cc. He/g., activity index 1.9, He index 13, and He retentivity 0.05; quartz and plagioclase, 1.1 x 10^{-5} cc. He/g.,

MASSACHUSETTS (contd.)

Middlesex County (contd.)
Radioactive Rocks
North Chelmsford
Fletcher quarry:
activity index 1.5, He index 23, and He retentivity 0.09; muscovite, 1.43 x 10^{-5} cc. He/g., activity index 1.5, He index 29, and He retentivity 0.12; biotite, 33.4 x 10^{-5} cc. He/g., activity index 13.1, He index 78, and He retentivity 0.31; magnetic chlorite, 6.6 x 10^{-5} cc. He/g., activity index 11.3, He index 18, and He retentivity 0.07; magnetite, 70 x 10^{-5} cc. He/g., activity index 13; epidote, 320 x 10^{-5} cc. He/g., activity index 213, He index 46, and He retentivity 0.18; garnet, 40.3 x 10^{-5} cc. He/g., activity index 3.58, He index 340, and He retentivity 1.36; apatite, 4260 x 10^{-5} cc. He/g., activity index 710, He index 185, and He retentivity 0.74; zircon, 120000 x 10^{-5} cc. He/g., activity index 14,000, He index 260, and He retentivity 1.03; sphene, 248 x 10^{-5} cc. He/g., activity index 8, He index 955, and He retentivity 3.82: 804; comparison of radioactivity of some minerals in Chelmsford granite-migmatite and California Lakeview tonalite, in terms of activity index, listed in alpha/mg/hr, gave the following results: Chelmsford: zircon, 14,000; apatite, 710; sphene, 8; epidote, 213; and biotite, 25: 804;

MASSACHUSETTS (contd.)

Middlesex County (contd.)
Radioactive Rocks
North Chelmsford
Fletcher quarry: comparison of radioactivity of some minerals in Chelmsford granite-migmatite and California Lakeview tonalite, in terms of activity index, listed in alpha/mg/hr., gave the following results: Lakeview: zircon, 401; apatite 56; sphene 256; epidote, no listing, and biotite, 0.4; the chief differences lie in low activity for sphene and high activity for epidote in the Chelmsford granite-migmatite; the zircon has the highest specific activity found for minerals separated from the normal range of granitic rocks, the 14,000 being equivalent to a Th content of approximately 0.08 g/g. and a Ra content of 7×10^{-9} g/g.; also the Lakeview tonalite has a radioactivity of only 0.8 alpha/mg/hr. and a Ra content of 4.9×10^{-13} g Ra/g while the Chelmsford granite-migmatite has an activity index 10 times as high and a Ra content of 53×10^{-13} g Ra/g: 804.
Thorite Occurrences
Woburn
Blueberry Mountain, 9 mi. NNW of Boston: allanite occurs abundantly in quartz and in feldspar and orangite and thorite occur as small crystals scattered throughout the pegmatite; all three minerals produce radial cracks in the matrix; mineralogy: 919; allanite crystals in feldspar and quartz, thorite in tiny reddish-brown crystals, and orangite in small glassy needle-like crystals also found, but rare, with allanite: 735; pegmatites associated with Dedham granodiorite include the following in their mineral content, allanite, orangite, thorite, and cyrtolite: 672.

MASSACHUSETTS (contd.)

Middlesex County (contd.)
Thorium Occurrences
Ayer: monazite in gneiss: 726.
Blueberry Mountain at Winchester: age determinations on allanite gave two sets of values for the rim and for the core; at the rim, values were 2.154% ThO_2 or 1.893% Th, 0.0312% U_3O_8 or 0.0265% U, and age ratio, 0.050; at the core, values were 2.285% ThO_2 or 2.01% Th, 0.0117% U_3O_8 or 0.0099% U, and age ratio, 0.0423: 828.
Boxborough: gadolinite, questionable occurrence, may be orthite: 924; orthite with brown hornblende and spinel: 924.
Chelmsford: thorium-uranium ratio for Late Paleozoic granitic type rock, 1.7; radioactivity of 8.0×10^{-6} g. U/g. rock and 14.0×10^{-6} g. Th/g. rock: 800.
General Crushed Stone quarry on Blueberry Mountain: gabbro-diorite, mean value of radioactivity $0.16 \pm 0.01 \times 10^{-12}$ g. Ra/g. rock, $0.45 \pm 0.03 \times 10^{-6}$ g. U/g. rock, $1.6 \pm 0.3 \times 10^{-6}$ g. Th/g. rock, Th/U ratio, 3.6: 745.
Graniteville in Fletcher quarry: radioactivity determinations on samples of Ayer granite of late- to post-Carboniferous age, known commercially as "Chelmsford granite": 0.007% eU, 0.000% U, and 0.013% ThO_2 for chip sample from quarry face; 0.004% eU and no determinations for U or ThO_2 content in two grab samples of trimming rock and of waste of minus 1/8 inch rock: 793.

MASSACHUSETTS (contd.)

Middlesex County (contd.)
Thorium Occurrences
Hopkinton
Hopkinton quarry, 1 mi. S of Hayden Row and 3 3/4 mi. NNE of Milford, operated by Massachusetts Pink Granite Co.: allanite rimmed with epidote as an accessory mineral in medium, slightly pinkish gray biotite granite: 715, 716.
Maguire quarry, 0.5 mi. W of Echo Lake, operated by Norcross Milford Pink Granite Co.: allanite as an accessory mineral in granite, like the Cutting quarry: 715.
North Chelmsford
Fletcher quarry: radioactivity studies made on over 20 samples of rock and mineral concentrates of Ayer Chelmsford granite; more than half the activity is due to accessory minerals; zircon, apatite, epidote, and biotite have more than five times the radioactivity of the parent rock: 804; comparison of radioactivity of some minerals in Chelmsford granite-migmatite and California Lakeview tonalite, in terms of activity index, listed in alpha/mg/hr., gave the following results: Chelmsford: zircon, 14,000; apatite, 710; sphene, 8; epidote, 2.3; and biotite, 25: 804; comparison of radioactivity of some minerals in Chelmsford granite-migmatite and California Lakeview tonalite, in terms of activity index, listed in alpha/mg/hr., gave the following results: Lakeview: zircon, 401; apatite, 56; sphene, 256; epidote, no listing; and biotite, 0.4; the chief differences lie in low activity for sphene and high activity for epidote in the Chelmsford granite-migmatite; the zircon has the highest specific activity found for

MASSACHUSETTS (contd.)

Middlesex County (contd.)
Thorium Occurrences
North Chelmsford
Fletcher quarry:
minerals separated from the normal range of granitic rocks, the 14,000 being equivalent to a Th content of approximately 0.08 g/g, and a Ra content of 7×10^{-9} g/g; also the Lakeview tonalite has a radioactivity of only 0.8 alpha/mg/hr. and a Ra content of 4.9×10^{-13} g. Ra/g. while the Chelmsford granite-migmatite has an activity index 10 times as high and a Ra content of 53×10^{-13} g. Ra/g: 804; helium and radioactivity data for migmatite, 16.8×10^{-5} cc. He/g., 59 and 46×10^{-13} g. Ra/g., or an average of 53×10^{-13} g. Ra/g., 26×10^{-6} g. Th/g., and average activity 7.82 alpha /mg/hr.: 803; helium and radioactivity data for pegmatite, essentially feldspar, 0.58×10^{-5} cc. He/g., 5.9×10^{-13} g. Ra/g., 1.9×10^{-6} g. Th/g., and activity 0.78 alpha/mg/hr.: 803.
Westford: monazite in gneiss: 726.
Winchester: black platy allanite crystals in pegmatite in a trap rock quarry: 1088.
Woburn
Blueberry Mountain, 9 mi. NNW of Boston: allanite occurs abundantly in quartz and in feldspar and orangite and thorite occur as small crystals scattered throughout the pegmatite; all three minerals produce radial cracks in the matrix; mineralogy: 919; orangite, allanite in feldspar matrix: 1072;

MASSACHUSETTS (contd.)

Middlesex County (contd.)

Thorium Occurrences

Woburn

Blueberry Mountain, 9 mi. NNW of Boston: pegmatites associated with Dedham granodiorite include the following in their mineral content, allanite, orangite, thorite, and cyrtolite: 672; four chemical analyses of allanite gave respectively 0.11, 0.039, 0.0265, and 0.0099% U, 2.013, 1.76 and 1.63, 1.893, and 2.008% Th, and ages of 340, 400 or 430, 400, and 340 m.y.: 925; allanite, average Pb/U ratio 0.043 and geologic age 310 m.y.: 948.

Blueberry Mountain quarry: allanite crystals in feldspar and quartz, thorite in tiny reddish-brown crystals, and orangite in small glassy needle-like crystals also found, but rare, with allanite: 735.

Uranium Occurrences

Blueberry Mountain at Winchester: age determinations on allanite gave two sets of values for the rim and for the core; at the rim, values were 2.154% ThO_2 or 1.893% Th, 0.0312% U_3O_8 or 0.0265% U, and age ratio, 0.050; at the core, values were 2.285% ThO_2 or 2.01% Th, 0.0117% U_3O_8 or 0.0099% U, and age ratio, 0.0423: 828.

Chelmsford: thorium-uranium ratio for Late Paleozoic granitic type rock, 1.7; radioactivity of 8.0×10^{-6} g. U/g. rock and 14.0×10^{-6} g. Th/g. rock: 800.

General Crush Stone quarry on Blueberry Mountain: gabbro-diorite, mean value of radioactivity 0.16 $\pm$ 0.01×10^{-12} g. Ra/g. rock 0.45 $\pm$ 0.03×10^{-6} g. U/g. rock, 1.6 $\pm$ 0.3×10^{-6} g. Th/g. rock, Th/U ratio, 3.6: 745.

MASSACHUSETTS (contd.)

Middlesex County (contd.)

Uranium Occurrences

Graniteville in Fletcher quarry: radioactivity determinations on samples of Ayer granite of late- to post-Carboniferous age, known commercially as "Chelmsford granite": 0.007% eU, 0.000% U, and 0.013% ThO_2 for chip sample from quarry face; 0.004% eU and no determinations for U or ThO_2 content in two grab samples of trimming rock and of waste of minus 1/8 inch rock: 793.

Woburn

Blueberry Mountain, 9 mi. NNW of Boston: allanite occurs abundantly in quartz and in feldspar and orangite and thorite occur as small crystals scattered throughout the pegmatite; all three minerals produce radial cracks in the matrix; mineralogy: 919; orangite, allanite in feldspar matrix: 1072; pegmatites associated with Dedham granodiorite include the following in their mineral content, allanite, orangite, thorite, and cyrtolite: 672; four chemical analyses of allanite gave respectively 0.11, 0.039, 0.0265, and 0.0099% U, 2.013, 1.76 and 1.63, 1.893, and 2.008% Th, and ages of 340, 400 or 430, 400, and 340 m.y.: 925; allanite average Pb/U ratio 0.043 and geologic age 310 m.y.: 948.

Blueberry Mountain quarry: allanite crystals in feldspar and quartz, thorite in tiny reddish-brown crystals, and orangite in small glassy needle-like crystals also found, but rare, with allanite: 735.

MASSACHUSETTS (contd.)

Middlesex County (contd.)

Uranium Processes

American Cyanamid Company's Mineral Dressing Laboratory at Watertown: to carry on research for new methods of uranium recovery from various ores and to assist existing uranium processing plants to improve their recovery techniques: 1060.

Winchester: U.S.A.E.C.'s raw materials development laboratory for developing process for treatment of uranium ores and production of uranium concentrates now operated by National Lead Co. instead of American Cyanamid Co.; test and pilot plant work have led to commercial scale plants on the Colorado Plateau and elsewhere: 1082.

Uranium Production

American Cyanamid Company's Mineral Dressing Laboratory at Watertown: to carry on research for new methods of uranium recovery from various ores and to assist existing uranium processing plants to improve their recovery techniques: 1060.

Winchester: U.S.A.E.C's raw materials development laboratory for developing processes for treatment of uranium ores and production of uranium concentrates now operated by National Lead Co. instead of American Cyanamid Co.; test and pilot plant work have led to commercial scale plants on the Colorado Plateau and elsewhere: 1082.

Monazite Occurrences

See under individual county names and under Index III, Thorium Occurrences-Massachusetts: 104, 726, 950.

MASSACHUSETTS (contd.)

Norfolk County

Allanite Occurrences

Milton

Mount Pleasant quarry at NW foot of Blue Hills, operated by Mount Pleasant Quarry Co.: allanite as an accessory mineral in the dark Quincy granite: 715; allanite as an accessory mineral in "dark Quincy" granite: 716.

Maguire and O'Heron quarry at NW foot of Blue Hills: allanite as an accessory mineral in the dark Quincy granite, like the Mount Pleasant quarry: 715.

Quincy

Ballou quarry of the Quincy Granite Co., North Common Hill: cylindrical pegmatite dike contains allanite among other accessory minerals: 715; allanite (unidentified) as traces in zircon-quartz group of pegmatites: 1007.

Sartori quarry on Pine Hill on SE side of Blue Hills: allanite as an accessory mineral in granite: 716; allanite as an accessory in the altered riebeckite-aegirite granite: 715.

Radioactive Rocks

D.H. Dell Hitchcock quarry, South Quincy: radioactivity determinations on sample of Quincy granite gave 5.31×10^{-5} cc. He/g., 12.5×10^{-13} g. Ra/g., 11.75×10^{-6} g. Th/g., age 67 $\pm$ 4 m.y.: 746.

MASSACHUSETTS (contd.)

Norfolk County (contd.)

Radioactive Rocks

Quincy: age determinations were made on specimens of Quincy granite taken from a range of from 12 to over 600 ft. in neighboring quarries about 100 yds. apart and from a quarry 3 mi. away: methods described; values found in a series of determinations were: 3.0, 3.9, 3.3, 4.8, 4.1, 2.75, 3.54, 4.33, 5.31, and 4.18 x 10^{-5} cc. He/g., 10.35, 7.75, 10.9, 12.85, 12.2, 9.50, 9.8, and 12.5 x 10^{-13} g. Ra/g., and 5.9, 10.6, 7.8, 10.2, 9.0, 7.0, 12.4, and 11.7 x 10^{-6} g. Th/g.:801; determinations made on one Quincy granite for both the rock and its individual minerals gave the following results: for the granite, 4.33 +- 0.04 x 10^{-5} cc. He/g., 9.8 +- 0.32 x 10^{-13} g. Ra/g., 2.78 x 10^{-6} g. U/g., 12.4 +- 0.47 x 10^{-6} g. Th/g., Th/U 4.5, and age 63 +- 3 m.y.; for the ferromagnesians the values were 11.4 +- 0.1 x 10^{-5} cc. He/g., 17.8 +- 0.54 x 10^{-13} g. Ra/g., 5.05 x 10^{-6} g. U/g., 25.0 +- 0.38 x 10^{-6} g. Th/g., Th/U 5.0, and age 86 +- 5 m.y.; for the quartz, the values were 2.60 +- 0.06 x 10^{-5} cc. He/g., 6.1 +- 0.2 x 10^{-13} g. Ra/g., 1.73 x 10^{-6} g. U/g., 3.40 +- 0.27 x 10^{-6} g. Th/g., Th/U 2.0, and age 86 +- 5 m.y.; for the feldspar, the values were 1.54 +- 0.02 x 10^{-5} cc. He/g., 4.15 +- 0.21 x 10^{-13} g. Ra/g., 1.18 x 10^{-6} g. U/g., 6.19 +- 0.20 x 10^{-6} g. Th/g., Th/U 5.2, and age 49 +- 3 m.y.; the weighted average of the minerals gave values of 2.75 x 10^{-5} cc. He/g., 6.0 x 10^{-13} g. Ra/g., 1.7 x 10^{-6} g. U/g., 7.0 x 10^{-6} g. Th/g., Th/U 4.1, and age 68 +- 4 m.y.; these relationships were consistent in 9 experiments suggesting that this distribution between mineral constituents is characteristic of the Quincy granite, since He, Ra, and Th contents of the rock are fairly uniform over a considerable distance: 801;

MASSACHUSETTS (contd.)

Norfolk County (contd.)

Radioactive Rocks

Quincy: radioactivity determinations on Quincy granite specimens collected by Keevil in 1937; results of studies on eight specimens from different depths were the following: two samples at 12 ft., 3.0 and 3.96 x 10^{-5} cc. He/g., 10.4 and 7.8 x 10^{-13} g. Ra/g., 5.9 and 10.58 x 10^{-6} g. Th/g., age 56 +- 3 and 66 +- 3 m.y.; fine sample at 150 ft., 3.3 x 10^{-5} cc. He/g., 10.9 x 10^{-13} g. Ra/g., 7.79 x 10^{-6} g. Th/g., age 54 +- 3 m.y.; coarse sample at 150 ft., 4.18 (?) x 10^{-5} cc. He/g., 12.9 x 10^{-13} g. Ra/g., 10.2 x 10^{-6} g. Th/g., age 63 +- 4 m.y.; sample at 350 ft., 2.8 (?) x 10^{-5} cc. He/g., 9.50 x 10^{-13} g. Ra/g., 7.04 x 10^{-6} g. Th/g., age 53 +- 3 m.y.; second sample from same level, 3.5 x 10^{-5} cc. He/g., age 67 +- 5 m.y.; sample of fine dark "Knot" at 150 ft., 7.2 x 10^{-5} cc. He/g., 15.5 x 10^{-13} g. Ra/g., 20.8 x 10^{-6} g. Th/g., age 62 +- 3 m.y.; sample of coarse "Knot" at 150 ft., 6.9 x 10^{-5} cc. He/g., age 67 +- 5 m.y.: 746; tests by Keevil in 1938 on eight different samples of Quincy granite gave ranges of 2.75 to 5.31 x 10^{-5} cc. He/g., 0.77 to 1.28 x 10^{-12} g. Ra/g., 5.9 to 12.4 x 10^{-6} g. Th/g., average values for the whole rock were 0.98 x 10^{-12} g. Ra/g., 2.78 x 10^{-6} g. U/g., 12.4 x 10^{-6} g. Th/g., 4.33 x 10^{-5} cc. He/g., Th/U 4.5, 3.8 x 10^{-2} g. K/g.: 773; approximate U and Th contents of powdered Quincy granite determined with nuclear photographic emulsions; results for one powdered specimen were 5.1 x 10^{-6} g. U/g., 18.7 x 10^{-6} g. Th/g., 1.7 x 10^{-12} g. Ra/g., and Th/U 3.7,

MASSACHUSETTS (contd.)

Norfolk County (contd.)
Radioactive Rocks
Quincy:
and for the second powdered specimen, 2.1×10^{-6} g. U/g., 10.4×10^{-6} g. Th/g., 0.7×10^{-12} g. Ra/g., and Th/U 4.9: 773; the photographic method seems suited perfectly to the study of radioactive centers in rocks; in Quincy granite the radioactive centers seem to be concentrated in sphene and ilmenite: 773; comparison of results from nuclear photographic emulsion tests with those from other methods indicates that variations in U and Th concentrations are about the same regardless of whether the photographic or some other method is used; indubitable proof by the photographic method that determination of U and Th concentration in the total mass of rock cannot be made with any reasonable accuracy by any of the methods, may lead to a new approach to interpretation of He age determinations on rocks: 773.
Swingle Quarry: helium and radioactivity data: for cognate xenolith, 7.7×10^{-5} cc. He/g., 15.5×10^{-13} g. Ra/g., 20.8×10^{-6} g. Th/g., and activity 3.45 alpha /mg./hr.: 803; helium and radioactivity data: for riebeckite granite, 3.8×10^{-5} cc. He/g., 10.6×10^{-13} g. Ra/g., 9.30×10^{-6} g. Th/g., activity 1.89 alpha /mg./hr.: 803; helium and radioactivity data: for feldspar, 1.65×10^{-5} cc. He/g., 4.15×10^{-13} g. Ra/g., 6.9×10^{-6} g. Th/g., and activity 0.98 alpha /mg./hr.: 803; helium and radioactivity data: for quartz, 2.03×10^{-5} cc. He/g., 6.11×10^{-13} g. Ra/g., 3.40×10^{-6} g. Th/g., and activity 0.93 alpha /mg./hr.: 803; helium and radioactivity data: for riebeckite and aegirite, 10.6×10^{-5} cc. He/g., 17.8×10^{-13} g. Ra/g., 25.0×10^{-6} g. Th/g., and activity 4.07 alpha /mg./hr.: 803;

MASSACHUSETTS (contd.)

Norfolk County (contd.)
Radioactive Rocks
Quincy
Swingle Quarry: Quincy granite, possibly Mississippian but probably late Paleozoic in age, mean value of radioactivity $0.94 \pm 0.19 \times 10^{-12}$ g. Ra/g. rock, $2.7 \pm 0.5 \times 10^{-6}$ g. U/g. rock, $8.1 \pm 2.0 \times 10^{-6}$ g. Th/g. rock, and Th/U ratio 3.0: 745; radioactivity determinations on two samples of Quincy granite: sample at 150 ft. gave, $3.7 \pm 0.27 \times 10^{-5}$ cc. He/g., 1.42-1.52 alphas, age 77 m.y.; sample from drillhole over 600 ft. deep gave, 4.18×10^{-5} cc. He/g., 1.85-1.95 alphas, age 68 m.y.: 746; age determinations on Quincy riebeckite granite at 150 ft. by three different methods gave the following results: using the direct fusion alpha-count method the results were $4.0 \pm 0.5 \times 10^{-5}$ cc. He/g., age 76 ± 10 m.y., but the average value for a large specimen was 4.1×10^{-5} cc. He/g. and the average of 8 He determinations on specimens from adjacent quarries was 3.9×10^{-5} cc. He/g.; for a specimen at 600 ft. the results were $4.17 \pm 0.12 \times 10^{-5}$ cc. He/g., age 68 ± 7 m.y.: 799; age determinations on Quincy riebeckite granite at 150 ft. by three different methods gave the following results: using the indirect Rn, Tn, He method, one sample gave $3.3 \pm 0.2 \times 10^{-5}$ cc. He/g., $10.9 \pm 0.33 \times 10^{-13}$ g. Ra/g., $7.8 \pm 0.57 \times 10^{-6}$ g. Th/g.,

MASSACHUSETTS (contd.)

Norfolk County (contd.)

Radioactive Rocks

Quincy

Swingle quarry: age 59 +- 3 m.y., and a second sample gave 4.8 +- 0.4 x 10^{-5} cc. He/g., 12.9 +- 0.42 x 10^{-13} g. Ra/g., 10.2 +- 0.54 x 10^{-6} g. Th/g., age 69 +- 6 m.y.: 799; age determinations on Quincy riebeckite granite at 150 ft. by three different methods gave the following results: using the radon condensation method, the results were 4.1 +- 0.1 x 10^{-5} cc. He/g., 12.2 +- 0.4 x 10^{-13} g. Ra/g., 9.0 +- 0.6 x 10^{-6} g. Th/g., age 65 +- 7 m.y.: 799.

Swingle quarry in West Quincy: radioactivity determinations on grab sample of Quincy granite, 0.003% eU, 0.0004% U, and 0.001% ThO_2; similar radioactivity in Quincy granite at Quincy and Milton: 793.

Thorium Occurrences

Milton

Maguire and O'Heron quarry at NW foot of Blue Hills: allanite as an accessory mineral in the dark Quincy granite, like the Mount Pleasant quarry: 715.

Mount Pleasant quarry at NW foot of Blue Hills, operated by Mount Pleasant Quarry Co.: allanite as an accessory mineral in the dark Quincy granite: 715; allanite as an accessory mineral in "dark Quincy" granite: 716.

Quincy: thorium-uranium ratio of Paleozoic granitic type rock, 3.7; radioactivity of 3.05 x 10^{-6} g. U/g. rock and 10.6 x 10^{-6} g. Th/g. rock: 800; tests by Keevil in 1938 on eight different samples of Quincy granite gave ranges of 2.75 to 5.31 x 10^{-5} cc. He/g., 0.77 to 1.28 x 10^{-12} g. Ra/g., 5.9 to 12.4 x 10^{-6} g. Th/g.; average values for the whole rock were 0.98 x 10^{-12} g. Ra/g., 2.78 x 10^{-6} g. U/g., 12.4 x 10^{-6} g. Th/g., 4.33 x 10^{-5} cc. He/g., Th/U 4.5, 3.8 x x 10^{-2} g. K/g.: 773; approximate U and Th contents of powdered Quincy granite determined with nuclear photographic emulsions; results for one powdered specimen were 5.1 x 10^{-6} g. U/g., 18.7 x 10^{-6} g. Th/g., 1.7 x 10^{-12} g. Ra/g. and Th/U 3.7, and for the second powdered specimen, 2.1 x 10^{-6} g. U/g., 10.4 x 10^{-6} g. Th/g., 0.7 x 10^{-12} g. Ra/g., and Th/U 4.9: 773; the photographic method seems suited perfectly to the study of radioactive centers in rocks; in Quincy granite the radioactive centers seem to be concentrated in sphene and ilmenite: 773; comparison of results from nuclear photographic emulsion tests with those from other methods indicates that variations in U and Th concentrations are about the same regardless of whether the photographic or some other method is used; indubitable proof by the photographic method that determination of U and Th concentration in the total mass of rock cannot be made with any reasonable accuracy by any of the methods may lead to a new approach to interpretation of He age determinations on rocks: 773.

Ballou quarry of the Quincy Granite Co., North Common Hill: cylindrical pegmatite dike contains allanite among other accessory minerals: 715; allanite (unidentified) as traces in zircon-quartz group of pegmatites: 1007.

MASSACHUSETTS (contd.)

Norfolk County (contd.)

Thorium Occurrences

Quincy

Sartori quarry on Pine Hill on SE side of Blue Hills: allanite as an accessory mineral in granite: 716; allanite as an accessory in the altered riebeckite-aegirite granite: 715.

Swingle quarry: Quincy granite, possibly Mississippian but probably late Paleozoic in age, mean value of radioactivity 0.94 +- 0.19 x 10^{-12} g. Ra/g. rock, 2.7 +- 0.5 x 10^{-6} g. U/g. rock, 8.1 +- 2.0 x 10^{-6} g. Th/g. rock, and Th/U ratio 3.0: 745; helium and radioactivity data: for cognate xenolith, 7.7 x 10^{-5} cc. He/g., 15.5 x 10^{-13} g. Ra/g., 20.8 x 10^{-6} g. Th/g., and activity 3.45 alpha /mg./hr.: 803; helium and radioactivity data: for riebeckite granite, 3.8 x 10^{-5} cc. He/g., 10.6 x 10^{-13} g. Ra/g., 9.30 x 10^{-6} g. Th/g., activity 1.89 alpha /mg./hr.: 803; helium and radioactivity data: for feldspar, 1.65 x 10^{-5} cc. He/g., 4.15 x 10^{-13} g. Ra/g., 6.9 x 10^{-6} g. Th/g., and activity 0.98 alpha /mg./hr.: 803; helium and radioactivity data: for quartz, 2.03 x 10^{-5} cc. He/g., 6.11 x 10^{-13} g. Ra/g., 3.40 x 10^{-6} g. Th/g., and activity 0.93 alpha /mg./hr.: 803; helium and radioactivity data: for riebeckite and aegirite, 10.6 x 10^{-5} cc. He/g., 17.8 x 10^{-13} g. Ra/g., 25.0 x 10^{-6} g. Th/g., and activity 4.07 alpha /mg./hr.: 803.

Swingle quarry in West Quincy: radioactivity determinations on grab sample of Quincy granite, 0.003% eU, 0.0004% U, and 0.001% ThO_2; similar radioactivity in Quincy granite at Quincy and Milton: 793.

MASSACHUSETTS (contd.)

Norfolk County (contd.)

Uranium Occurrences

Quincy: thorium-uranium ratio of Paleozoic granitic type rock, 3.7; radioactivity of 3.05 x 10^{-6} g. U/g. rock and 10.6 x 10^{-6} g. Th/g. rock: 800; tests by Keevil in 1938 on eight different samples of Quincy granite gave ranges of 2.75 to 5.31 x 10^{-5} cc. He/g., 0.77 to 1.28 x 10^{-12} g. Ra/g., 5.9 to 12.4 x 10^{-6} g. Th/g.; average values for the whole rock were 0.98 x 10^{-12} g. Ra/g., 2.78 x 10^{-6} g. U/g., 12.4 x 10^{-6} g. Th/g., 4.33 x 10^{-5} cc. He/g., Th/U 4.5, 3.8 x 10^{-2} g. K/g.: 773; approximate U and Th contents of powdered Quincy granite determined with nuclear photographic emulsions; results for one powdered specimen were 5.1 x 10^{-6} g. U/g., 18.7 x 10^{-6} g. Th/g., 17 x 10^{-12} g. Ra/g., and Th/U 3.7, and for the second powdered specimen, 2.1 x 10^{-6} g. U/g., 10.4 x 10^{-6} g. Th/g., 0.7 x 10^{-12} g. Ra/g., and Th/U 4.9:773; the photographic method seems suited perfectly to the study of radioactive centers in rocks; in Quincy granite the radioactive centers seem to be concentrated in sphene and ilmenite: 773; comparison of results from nuclear photographic emulsion tests with those from other methods indicates that variations in U and Th concentrations are about the same regardless of whether the photographic or some other method is used; indubitable proof by the photographic method that determination of U and Th concentration in the total mass of rock cannot be made with any reasonable accuracy by any of the methods, may lead to a new approach to interpretation of He age determinations on rocks: 773.

MASSACHUSETTS (contd.)

Norfolk County (contd.)

Uranium Occurrences

Quincy

Swingle quarry: Quincy granite, possibly Mississippian but probably late Paleozoic in age, mean value of radioactivity 0.94 +/- 0.19 x 10^{-12} g. Ra/g. rock, 2.7 +/- 0.5 x 10^{-6} g. U/g., 8.1 +/- 2.0 x 10^{-6} g. Th/g. rock, and Th/U ratio 3.0: 745.

Swingle quarry in West Quincy: radioactivity determinations on grab sample of Quincy granite, 0.003% eU, 0.0004% U, and 0.001% ThO_2; similar radioactivity in Quincy granite at Quincy and Milton: 793.

Orangite Occurrences

See under individual county names and under Index III, Orangite Occurrences-Massachusetts: 672, 735, 919, 1006, 1072.

Orthite Occurrences

See under individual county names and under Index III, Thorium Occurrences-Massachusetts: 643, 924.

Paracolumbite Occurrences

See under individual county names and under Index III, Paracolumbite Occurrences-Massachusetts: 950, 951.

Pyrochlore Occurrences

See under individual county names and under Index III, Pyrochlore Occurrences-Massachusetts: 738, 883, 957, 981.

Radioactive Gases

See under individual county names and under Index III, Radioactive Gases-Massachusetts: 686, 903, 959.

Radioactive Minerals

See under individual county names and under Index III, Radioactive Minerals-Massachusetts: 802, 804.

MASSACHUSETTS (contd.)

Radioactive Rocks

See under individual county names and under Index III, Radioactive Rocks-Massachusetts: 745, 746, 773, 793, 798, 799, 801, 802, 803, 804, 898.

Radioactive Springs

See under individual county names and under Index III, Radioactive Springs-Massachusetts: 903, 959.

Radioactive Water

See under individual county names and under Index III, Radioactive Water-Massachusetts: 686.

Suffolk County

Radioactive Gases

Cambridge: results of studies seem to indicate that the radioactive gases found in the surface water and in the ground near New Haven are identical with radium emanation and if any other radioactive constituent is present, it can only be in very small proportion; density of the radium emanation is about four times that of carbon dioxide: 686; the fact that radioactivity of gas in water at Cambridge, Massachusetts, and in soils at various places in Germany, is also mainly due to radium emanation, may indicate that radium may be widely distributed in the earth although not always in the surface layers: 686.

Radioactive Water

Cambridge: results of studies seem to indicate that the radioactive gases found in the surface water and in the ground near New Haven are identical with radium emanation and if any other radioactive constituent is present,

MASSACHUSETTS (contd.)

Suffolk County (contd.)
Radioactive Water
Cambridge:
it can only be in very small proportion; density of the radium emanation is about four times that of carbon dioxide: 686; the fact that radioactivity of gas in water at Cambridge, Massachusetts, and in soils at various places in Germany, is also mainly due to radium emanation, may indicate that radium may be widely distributed in the earth although not always in the surface layers: 686.

Thorite Occurrences
See under individual county names and under Index III Thorite Occurrences-Massachusetts: 672, 735, 919, 1006.

Thorium Occurrences
See under individual county names and under Index III, Thorium Occurrences-Massachusetts: 104, 641, 643, 645, 653, 654, 662, 671, 672, 701, 715, 716, 726, 727, 735, 738, 739, 740, 741, 742, 745, 773, 778, 780, 787, 793, 797, 800, 803, 828, 834, 849, 883, 919, 924, 944, 948, 950, 954, 957, 981, 982, 1006, 1007, 1008, 1072, 1088, 1098, 1100.

Torbernite Occurrences
See under individual county names and under Index III, Torbernite Occurrences-Massachusetts: 672, 738, 797.

Uraninite Occurrences
See under individual county names and under Index III, Uraninite Occurrences-Massachusetts: 778, 948.

Uranite Occurrences
See under individual county names and under Index III, Uranite Occurrences-Massachusetts: 662, 738, 950, 957, 981.

MASSACHUSETTS (contd.)

Uranium Exploration
See under individual county names and under Index III, Uranium Exploration-Massachusetts: 793.

Uranium Occurrences
See under individual county names and under Index III, Uranium Occurrences-Massachusetts: 653, 654, 662, 671, 672, 735, 738, 739, 745, 773, 778, 797, 800, 828, 834, 883, 919, 948, 950, 951, 952, 954, 957, 963, 979, 980, 981, 982, 1006, 1072, 1098, 1100.
Bibliography of U.S.G.S Reports: 572, 1004.

Uranium Processes
See under individual county names and under Index III, Uranium Processes-Massachusetts: 1060, 1082.

Uranium Production
See under individual county names and under Index III, Uranium Production-Massachusetts: 1060, 1082.

Uranochre Occurrences
See under individual county names and under Index III, Uranochre Occurrences-Massachusetts: 738, 797, 950.

Worcester County
Allanite Occurrences
Athol: allanite: 1098.
Bolton: allanite: 1098; allanite in Bolton gneiss; typical occurrence at this locality: 739.
Fitchburg
McCauliff quarry at Rollstone Hill: allanite in thin but well-defined quartz stringers in granite and tourmaline pegmatites, occasionally replacing calcite in the pegmatite or associated with uraninite in the stringers: 778.

MASSACHUSETTS (contd.)

Worcester County (contd.)
Allanite Occurrences
Fitchburg
Rollstone Hill, in granite quarry: pegmatites are small, occur in Fitchburg granite and surrounding schists, and include the following in their mineral content, allanite, autunite, but these minerals are rare and have small crystals, usually less than one inch in diameter: 672.
Hardwick: allanite in Hardwick granite; typical occurrence at this locality: 739.
Milford
Carroll quarry operated by Webb Pink Granite Co.: allanite rimmed with epidote as an accessory mineral in light gray granite: 715; allanite rimmed with epidote as an accessory mineral in a white Milford granite: 716.
Cutting quarry operated by Milford Stone Co., 0.5 mi. S of Echo Lake: light gray biotite granite contains allanite as an accessory mineral: 715; allanite crystals coated with epidote as an accessory mineral in "Milford pink" granite: 716.
East quarry operated by Milford Stone Co.: light pinkish gray granite contains as an accessory mineral, allanite up to 0.6 mm. and rimmed with epidote; a green to gray vertical granite dike cutting across the quarry also contains allanite as an accessory mineral: 715; allanite rimmed with epidote in "Milford pink" granite: 716.
Massachusetts Pink quarry operated by Massachusetts Pink Granite Co.: allanite as an accessory in light-gray granite with a slightly pinkish tinge, like Cutting quarry: 715.

MASSACHUSETTS (contd.)

Worcester County (contd.)
Allanite Occurrences
Milford
Norcross quarry operated by Milford Stone Co. and located nearly 2 mi. NE of Milford: allanite as an accessory mineral in light pinkish-gray granite; its constituents are like those of East quarry: 715.
North Milford quarry, operated by North Milford Granite Co.: allanite as an accessory in light-gray granite with a slightly pinkish tinge, like the Cutting quarry: 715.
Royalston: allanite: 950.
South Royalston: allanite: 1098.
Autunite Occurrences
Fitchburg
Rollstone Hill, in granite quarry: pegmatites are small, occur in Fitchburg granite and surrounding schists, and include the following in their mineral content, allanite, autunite, but these minerals are rare and have small crystals, usually less than one inch in diameter: 672.
Gadolinite Occurrences
Bolton: gadolinite disseminated in limestone: 924.
Orthite Occurrences
Bolton: orthite, questionable occurrence, with nuttallite and scapolite: 924.
Radioactive Rocks
Fitchburg: radioactivity determinations on samples of Fitchburg granite and Fitchburg granite tourmaline pegmatite gave respectively 3.5 and 0.45 x 10^{-5} cc. He/g., 7.8 and 10.8 x 10^{-13} g. Ra/g., 19.0 and 1.24 x 10^{-6} g. Th/g., age 43 $\pm$ 5 and 19 $\pm$ 3 m.y.: 746.

Worcester County (contd.)
Radioactive Rocks
Fitchburg
Rollstone Quarry: helium and radioactivity data for granite, 3.17 x 10^{-5} cc. He/g., 7.8 & 14.1 x 10^{-13} g. Ra/g., or an average of 10.9 x 10^{-13} g. Ra/g., 19.0 x 10^{-6} g. Th/g., and average activity 2.63 alpha /mg./hr.: 803; helium and radioactivity data for pegmatite, essentially feldspar, 0.87 x 10^{-5} cc. He/g., 10.8 x 10^{-13} g. Ra/g., 1.24 x 10^{-6} g. Th/g. and 1.23 alpha / mg./hr.: 803.
Rollstone Hill quarry: Fitchburg granite, probably Carboniferous in age, mean value of radioactivity 0.88 +/- 0.18 x 10^{-12} g. Ra/g. rock, 2.5 +/- 0.5 x 10^{-6} g. U/g. rock, 21 +/- 5.0 x 10^{-6} g. Th/g. rock, and Th/U ratio 8.4: 745.
Milford: granite gave radioactivity of 0.378 x 10^{-12} g. Ra/g. rock: 898; redetermined radioactivity of granite, 0.26 x 10^{-12} g. Ra/g. rock: 899; apparatus and procedure used in making radioactivity determinations: 898, 899.
North Brookfield
New Braintree, near: radioactivity determinations on typical Brimfield schist, 0.004% eU, and no determinations for U or ThO_2 content; radioactivity determinations on Paxton quartz schist, a biotitic rock of Carboniferous age impregnated with considerable feldspar: 0.006% eU, 0.001% U, and 0.018% ThO_2: 793.
West Brookfield, near: radioactivity determinations on much decomposed Brimfield schist: 0.003% eU, no determinations for U or ThO_2 content: 793.

MASSACHUSETTS (contd.)

Worcester County (contd.)
Radioactive Rocks
Southbridge
Massachusetts and Connecticut Highway 15 at state boundary line, Area extending 1500 ft. NE along and 900 ft. normal to: radioactivity determinations on Carboniferous pegmatite in hornblende gneiss: channel sample of pegmatite from one of the most radioactive bands near Mashapaug Pond, 0.011% eU, 0.000% U, and 0.030% ThO_2; assuming there are about 11,000 t. of the more radioactive pegmatite material per foot of depth and that the channel sample is representative of entire area, then each foot of depth should contain about 6,500 lb. ThO_2: 793.
Worcester
Worcester sewage-disposal plant in Milbury, land on or adjacent to, and roadcut on U.S. Highway 20: radioactivity determinations on abnormally radioactive pegmatite in gneiss of undetermined age: channel sample from most radioactive part of pegmatite, 0.001% eU, 0.001% U, and 0.032% ThO_2; assuming from available outcrops and other observable geologic features that there are about 13,000 t. of abnormally radioactive pegmatite per foot of depth and that the channel sample tested is representative of the entire mass, then each foot of depth would contain about 250 lb. U and 8500 lb. ThO_2; origin of radioactive material unknown: 793.

MASSACHUSETTS (contd.)

Worcester County (contd.)

Thorium Occurrences

Athol: allanite: 1098.

Bolton: allanite: 1098; allanite in Bolton gneiss; typical occurrence at this locality: 739; gadolinite disseminated in limestone: 924; orthite, questionable occurrence, with nuttallite and scapolite: 924.

Fitchburg: thorium-uranium ratio for Late Paleozoic granitic type rock, 4.2; radioactivity of 2.5×10^{-6} g. U/g. rock and 10.1×10^{-6} g. Th/g. rock: 800; uraninite, average Pb/U ratio 0.050 and geologic age 370 m.y.: 948; chemical analysis of uraninite gave 50.20% U, 3.39% Th, and an age of 340 m.y.: 925.

McCauliff quarry at Rollstone Hill: allanite in thin but well-defined quartz stringers in granite and tourmaline pegmatites, occasionally replacing calcite in the pegmatite or associated with uraninite in the stringers: 778.

Rollstone Quarry: helium and radioactivity data for: granite, 3.17×10^{-5} cc. He/g., 7.8 & 14.1×10^{-13} g. Ra/g., or an average of 10.9×10^{-13} g. Ra/g., 19.0×10^{-6} g. Th/g., and average activity 2.63 alphas/mg./hr.: 803; helium and radioactivity data for pegmatite, essentially feldspar, 0.87×10^{-5} cc. He/g., 10.8×10^{-13} g. Ra/g., 1.24×10^{-6} g. Th/g., and 1.23 alphas/mg./hr.: 803.

Rollstone Hill quarry: Fitchburg granite, probably Carboniferous in age, mean value of radioactivity $0.88 \pm 0.18 \times 10^{-12}$ g. Ra/g. rock, $2.5 \pm 0.5 \times 10^{-6}$ g. U/g. rock, $21 \pm 5.0 \times 10^{-6}$ g. Th/g. rock, and Th/U ratio 8.4: 745.

Hardwick: allanite in Hardwick granite; typical occurrence at this locality: 739.

*Norcross quarry operated by Milford Stone Co. and located nearly 2 mi. NE of Milford; allanite as an accessory mineral in light pinkish-gray granite; its constituents are like those of East quarry: 715.

MASSACHUSETTS (contd.)

Worcester County (contd.)

Thorium Occurrences

Milford

Carroll quarry operated by Webb Pink Granite Co.: allanite rimmed with epidote as an accessory mineral in light gray granite: 715; allanite rimmed with epidote as an accessory mineral in a white Milford granite: 716.

Cutting quarry operated by Milford Stone Co., 0.5 mi. S of Echo Lake: light gray biotite granite contains allanite as an accessory mineral: 715; allanite crystals coated with epidote as an accessory mineral in "Milford pink" granite: 716.

East quarry operated by Milford Stone Co.: light pinkish gray granite contains as an accessory mineral, allanite up to 0.6 mm. and rimmed with epidote; a green to gray vertical granite dike cutting across the quarry also contains allanite as an accessory mineral: 715; allanite rimmed with epidote in "Milford pink" granite: 716.

H.E. Fletcher quarry: granite of post-Cambrian and pre-Carboniferous age, mean value of radioactivity $0.205 \pm 0.02 \times 10^{-12}$ g. Ra/g. rock: 745.

Massachusetts Pink quarry operated by Massachusetts Pink Granite Co.: allanite as an accessory in light-gray granite with a slightly pinkish tinge, like Cutting quarry: 715.

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MASSACHUSETTS (contd.)

Worcester County (contd.
Thorium Occurrences
Milford
North Milford quarry, operated by North Milford Granite Co.: allanite as an accessory in light-gray granite with a slightly pinkish tinge like Cutting quarry: 715.
North Brookfield
New Braintree, near: radioactivity determinations on typical Brimfield schist, 0.004% eU, and no determinations for U or ThO_2 content; radioactivity determinations on Paxton quartz schist, a biotitic rock of Carboniferous age impregnated with considerable feldspar; 0.006% eU, 0.001% U, and 0.018% ThO_2: 793.
Royalston: allanite: 950.
*South Royalston: allanite: 1098.
Worcester
Worcester sewage-disposal plant in Milbury, land on or adjacent to, and roadcut on U.S. Highway 20: radioactivity determinations on abnormally radioactive pegmatite in gneiss of undetermined age: channel sample from most radioactive part of pegmatite, 0.001% eU, 0.001% U, and 0.032% ThO_2; assuming from available outcrops and other observable geologic features that there are about 13,000 t. of abnormally radioactive pegmatite per foot of depth and that the channel sample tested is representative of the entire mass, then each foot of depth would contain about 250 lb. U and 8500 lb. ThO_2; origin of radioactive material unknown: 793.
*Southbridge
Massachusetts and Connecticut Highway 15 at state boundary line, Area extending 1500 ft. NE along and 900 ft. normal to: radioactivity determinations on Carboniferous pegmatite in hornblende gneiss; channel sample of pegmatite from one of the most radioactive bands near Mashapaug Pond, 0.011% eU, 0.000% U, and 0.030% ThO_2; assuming there are about 11,000 t. of the more radioactive pegmatite material per foot of depth and that the channel sample is representative of entire area, then each foot of depth should contain about 6,500 lb. ThO_2: 793.

MASSACHUSETTS (contd.)

Worcester County (contd.)
Uraninite Occurrences
Fitchburg: uraninite, average Pb/U ratio 0.050 and geologic age 370 m.y.: 948; chemical analysis of uraninite gave 50.20% U, 3.39% Th, and an age of 340 m.y.: 925.
McCauliff quarry at Rollstone Hill: allanite in thin but well-defined quartz stringers in granite and tourmaline pegmatites, occasionally replacing calcite in the pegmatite or associated with uraninite in the stringers: 778.
Uranium Occurrences
Fitchburg: thorium-uranium ratio for Late Paleozoic granitic type rock, 4.2; radioactivity of 2.5×10^{-6} g. U/g. rock and 10.1×10^{-6} g. Th/g. rock: 800; uraninite, average Pb/U ratio 0.050 and geologic age 370 m.y.: 948; chemical analysis of uraninite gave 50.20% U, 3.39% Th, and an age of 340 m.y.: 925.
McCauliff quarry at Rollstone Hill: allanite in thin but well-defined quartz stringers in granite and tourmaline pegmatites, occasionally replacing calcite in the pegmatite or associated with uraninite in the stringers: 778.
Rollstone Hill, in granite quarry: pegmatites are small, occur in Fitchburg granite and surrounding schists, and include the following in their mineral content, allanite, autunite, but these minerals are rare and have small crystals, usually less than one inch in diameter: 672.

MASSACHUSETTS (contd.)

Worcester County (contd.)

Uranium Occurrences

Fitchburg

Rollstone Hill quarry: Fitchburg granite, probably Carboniferous in age, mean value of radioactivity 0.88 +/- 0.18 x 10^{-12} g. Ra/g. rock, 2.5 +/- 0.5 x 10^{-6} g. U/g. rock, 21 +/- 5.0 x 10^{-6} g. Th/g. rock, and Th/U ratio 8.4: 745.

North Brookfield

New Braintree, near: radioactivity determinations on typical Brimfield schist, 0.004% eU, and no determinations for U or ThO_2 content; radioactivity determinations on Paxton quartz schist, a biotitic rock of Carboniferous age impregnated with considerable feldspar; 0.006% eU, 0.001% U, and 0.018% ThO_2: 793.

Worcester

Worcester sewage-disposal plant in Milbury, land on or adjacent to and roadcut on U.S. Highway 20: radioactivity determinations on abnormally radioactive pegmatite in gneiss of undetermined age: channel sample from most radioactive part of pegmatite, 0.001% eU, 0.001% U, and 0.032% ThO_2; assuming from available outcrops and other observable geologic features that there are about 13,000 t. of abnormally radioactive pegmatite per foot of depth and that the channel sample tested is representative of the entire mass, then each foot of depth would contain about 250 lb. U and 8500 lb. ThO_2; origin of radioactive material unknown: 793.

Southbridge

Massachusetts and Connecticut Highway 15 at state boundary line, Area extending 1500 ft. NE along and 900 ft. normal to: radioactivity determinations on Carboniferous pegmatite in hornblende gneiss: channel sample of pegmatite from one of the most radioactive bands near Mashapaug Pond, 0.001% eU, 0.000% U, and 0.030% ThO_2; assuming there are about 11,000 t. of the more radioactive pegmatite material per foot of depth and that the channel sample is representative of entire area, then each foot of depth should contain about 6,500 lb. ThO_2: 793.

Yttrocerite Occurrences

See under individual county names and under Index III, Yttrocerite Occurrences-Massachusetts: 672, 1006.

Zircon, Uranium-bearing

See under individual county names and under Index III, Zircon, U-bearing, Massachusetts: 738, 739, 797.

MICHIGAN

General
Black Shales, Uranium-bearing
General: uranium in black shales: 426; uranium in Antrim shale: 443; uranium in Devonian and Mississippian Antrim black shale: 841.
Geophysical Exploration (Airborne)
Northern Part: reports that aerial surveys by U.S.G.S. in 1950 revealed over 100 anomalies, presumably due to granitic rocks with a higher-than-average radioactivity, probably between 0.01-0.02% eU_3O_8 as found by Geiger counter investigations in granites in Africa and Canada: 722.
Geophysical Exploration (Ground)
Seismic Refraction method: 1014.
Iron Deposits, Uranium-bearing
General: primary uranium minerals have been found at several places in slates and iron formations of the iron ore country; most uranium occurrences are small and very low in grade but a few small veins of pitchblende approaching economic grade have been found in some Michigan iron mines: 883.
Pitchblende Occurrences
General: primary uranium minerals have been found at several places in slates and iron formations of the iron ore country; most uranium occurrences are small and very low in grade but a few small veins of pitchblende approaching economic grade have been found in some Michigan iron mines: 883.
Prospectors' Guides
Exploration methods: 1101.
Mining laws: 1101.
Uranium: 812, 1101.
Regulations regarding Prospecting for Uranium on State-owned Land
Exploration methods: 1091.
Leases: 1091.
Mining laws: 1091.
Mining methods: 1091.
Royalty payments to state: 1091.

MICHIGAN (contd.)

General (contd.)
Prospectors' Guides
Regulations regarding Prospecting for Uranium on State-owned Land
State lands: summary of mining regulations applicable to land owned by the state of Michigan, on which uranium indications might be found and a lease desired for mining and development purposes; recommendations being made to Department of Conservation to simplify present regulations, because of the unusual nature of uranium prospecting as compared to methods used for other natural resources like oil, gas, coal, etc, and to prevent undue delay which might make it difficult for a prospector to collect a U.S.A.E.C. bonus for discovering a rich uranium deposit: 892.
Radioactive Rocks
Duluth gabbro specimen from Prof. Willis Seaman: radioactivity determinations on Duluth gabbro gave 1.83×10^{-5} cc. He/g., 1.33×10^{-13} g. Ra/g., age 410 m.y.: 992.
Northern Part: reports that aerial surveys by U.S.G.S. in 1950 revealed over 100 anomalies, presumably due to granitic rocks with a higher-than-average radioactivity, probably between 0.01-0.02% eU_3O_8 as found by Geiger counter investigations in granites in Africa and Canada: 722.

MICHIGAN (contd.)

General (contd.)
Thorium Occurrences
General: primary uranium minerals have been found at several places in slates and iron formations of the iron ore country; most uranium occurrences are small and very low in grade but a few small veins of pitchblende approaching economic grade have been found in some Michigan iron mines: 883; no uranium reported as yet; mineral specimens from unnamed locations in state examined by U.S.A.E.C. showed presence of thorium and no uranium: 1045.
Uranium Exploration
General: very active prospecting work going on but no uranium found as yet; applications for prospecting leases on state land: 1045.
Exploration methods: 1101.
Mining laws: 1101.
Prospectors' Guide: 812, 1101.
Geophysical Exploration (Airborne)
Northern Part: reports that aerial surveys by U.S.G.S. in 1950 revealed over 100 anomalies, presumably due to granitic rocks with a higher-than-average radioactivity, probably between 0.01-0.02% eU_3O_8 as found by Geiger counter investigations in granites in Africa and Canada: 722.
Regulations regarding Prospecting for Uranium on State-owned Land
Leases: 1091.
Methods: 1091.
Mining laws: 1091.
Mining methods: 1091.
Prospectors' Guide: 1091.
Royalty payment to state: 1091.
State lands: summary of mining regulations applicable to land owned by the state of Michigan, on which uranium indications might be found and a lease desired for mining and development purposes; recommendations being made to Department of Conservation to simplify present regulations, because of the unusual

MICHIGAN (contd.)

General (contd.)
Uranium Exploration
Regulations regarding Prospecting for Uranium on State-owned Lands
State lands:
nature of uranium prospecting as compared to methods used for other natural resources like oil, gas, coal, etc, and to prevent undue delay which might make it difficult for a prospector to collect a U.S.A.E.C. bonus for discovering a rich uranium deposit: 892.
Uranium Exploration (Airborne)
Northern Part: reports that aerial surveys by U.S.G.S. in 1950 revealed over 100 anomalies, presumably due to granitic rocks with a higher-than-average radioactivity, probably between 0.01-0.02% eU_3O_8 as found by Geiger counter investigations in granites in Africa and Canada: 722.
Uranium Occurrences
General: primary uranium minerals have been found at several places in slates and iron formations of the iron ore country; most uranium occurrences are small and very low in grade but a few small veins of pitchblende approaching economic grade have been found in some Michigan iron mines: 883; uranium in black shales: 426; uranium in Antrim shale: 443; uranium in Devonian and Mississippian Antrim black shale: 841; no uranium reported as yet; mineral specimens from unnamed locations in state examined by U.S.A.E.C. showed presence of thorium and no uranium: 1045.
Northern Part: uranium found in vein and disseminated deposits: 1106.
Types: hydrothermal vein deposits: 62.

MICHIGAN (contd.)

General (contd.)
Uranium Occurrences
Black Shale, Uranium-bearing
General: uranium in black shales: 426; uranium in Antrim shale: 443; uranium in Devonian and Mississippian Antrim black shale: 841.
Iron Deposits, Uranium-bearing
General: primary uranium minerals have been found at several places in slates and iron formations of the iron ore country; most uranium occurrences are small and very low grade but a few small veins of pitchblende approaching economic grade have been found in some Michigan iron mines: 883.

Age Determinations
See under individual county names and under Index III, Age Determinations-Michigan: 829.

Allanite Occurrences
See under individual county names and under Index III, Thorium Occurrences-Michigan: 965, 1022.

Baraga County
Allanite Occurrences
Republic area in feldspar quarry in Sec. 22, T. 47 N., R. 29 W.: allanite: 965.
Carnotite Occurrences
Mohatin Hills mines: carnotite: 840.
Pitchblende Occurrences
General: pitchblende in vein deposits: 455; core-drilling by E. J. Longyear Co. begun at pitchblende showing on Jones and Laughlin Steel Corporation uranium lease on state-owned land: 1047.
L'Anse, 15 mi. NE of, on Huron River: uranium oxide as pitchblende or uraninite identified in isolated forest area in Upper Peninsula; discovered for Jones and Laughlin Ore Co. by Eiler Hendrickson; size and value of deposit not known: 1051.

MICHIGAN (contd.)

Baraga County (contd.)
Pitchblende Occurrences
Huron River: pitchblende associated with copper and zinc minerals: 995.
Huron River, area along East Branch: uranium prospect discovered in 1949 by geologist of Jones and Laughlin Ore Co.; subsequent drilling by this company and the Ford Motor Co. showed only minor amounts of radioactive materials at shallow depths in immediate vicinity of surface showings; pitchblende and secondary uranium minerals occur as very small discontinous stringers and pods in quartz and calcite veinlets with a low-angle shear zone cutting black, locally graphitic slates of the Michigamme slate of Upper Huronian (Precambrian) age; mineralization shows three stages, two hypogene and one supergene, and close association of uranium and copper minerals; deposits resemble some pitchblende deposits of Colorado Front Range but lack the Co-Ni association of the Canadian occurrences: 994.
Jones and Laughlin Ore Co. property: pitchblende: 1050.
Radioactivity Surveys (Airborne)
General: airborne radioactivity survey showed one anomaly, which may be due to the presence of uranium, thorium, or both, at the border between Baraga County and Powell township in Marquette County: 970.
Thorium Occurrences
Huron River: pitchblende associated with copper and zinc minerals: 995.

MICHIGAN (contd.)

Baraga County (contd.)

Thorium Occurrences

Huron River, area along East Branch: uranium prospect discovered in 1949 by geologist of Jones and Laughlin Ore Company; subsequent drilling by this company and the Ford Motor Company showed only minor amounts of radioactive materials at shallow depths in immediate vicinity of surface showings; pitchblende and secondary uranium minerals occur as very small discontinuous stringers and pods in quartz and calcite veinlets with a low-angle shear zone cutting black, locally graphitic slates of the Michigamme slate of Upper Huronian (Precambrian) age; mineralization shows three stages, two hypogene and one supergene, and close association of uranium and copper minerals; deposits resemble some pitchblende deposits of Colorado Front range but lack the Co-Ni association of the Canadian occurrences: 994.

Republic area in feldspar quarry in Sec.22, T. 47 N., R. 29 W.: allanite: 965.

Uraninite Occurrences

L'Anse, 15 mi. NE of, on Huron River: uranium oxide as pitchblende or uraninite identified in isolated forest area in Upper Peninsula; discovered for Jones and Laughlin Ore Co. by Eiler Hendrickson; size and value of deposit not known: 1051.

Huron River gorge: uraninite: 267.

Uranium Exploration

General: one of first two Michigan leases for uranium exploration on state-owned land granted to Jones and Laughlin Ore Co.; 10% royalty to be paid to state from any profits made by the firm: 1048; core-drilling by E. J. Longyear Co. begun at pitchblende showing on Jones and Laughlin Steel Corporation uranium lease on state-owned land: 1047.

MICHIGAN (contd.)

Baraga County (contd.)

Uranium Exploration

L'Anse, 18 mi. NE of: uranium deposits found to be non-commercial on detailed study; Jones and Laughlin Ore Co., subsidiary of steel company, relinquished lease on 80 state-owned acres in area: 1066.

Huron Mts.: reconnaissance geological mapping to be carried on by U.S.A.E.C. during summer field season: 1114.

Uranium Occurrences

General: pitchblende in vein deposits: 455; core-drilling by E. J. Longyear Co. begun at pitchblende showing on Jones and Laughlin Steel Corporation uranium lease on state-owned land: 1047; one of first two Michigan leases for uranium exploration on state-owned granted to Jones and Laughlin Ore Co.; 10% royalty to be paid to state from any profits made by the firm: 1048.

L'Anse, 15 mi. NE of, on Huron River: uranium oxide as pitchblende or uraninite identified in isolated forest area in Upper Peninsula; discovered for Jones and Laughlin Ore Co. by Eiler Hendrickson; size and value of deposit not known: 1051.

L'Anse, 18 mi. NE of: uranium deposits found to be non-commercial on detailed study; Jones and Laughlin Ore Co., subsidiary of steel company, relinquished lease on 80 state-owned acres in area: 1066.

L'Anse, 30 mi. from: uranium in vanadium ores: 41.

MICHIGAN (contd.)

Baraga County (contd.)
Uranium Occurrences
Area 7 mi. N of Skanee and 30 mi. from L'Anse: uranium in vanadium ores: 41; chemical and mineralogical analyses of vein minerals, reported as vanadium minerals by Joseph and McGhee, showed no uranium or vanadium content: 632.
Bug Hole mine, Mohatin Hills, near Skanee: uranium: 840.
Graphite Quarry: yellow-green uranium minerals associated with altered lamprophyre dike cutting graphitic black slate; selected samples contained over 0.1% uranium and radioactivity seems to increase with depth; minable tonnages of ore grade material were not observed but higher-grade, unexposed material may exist at depth or along the dike: 995.
Huron Mts.: uranium: 1003; uranium reported here in 1914 but later examination of same area showed that no uranium or vanadium was present; reconnaissance geological mapping to be carried on by U.S.A.E.C. during summer field season: 1114.
Huron River: pitchblende associated with copper and zinc minerals: 995.
Huron River, area along East Branch: uranium prospect discovered in 1949 by geologist of Jones and Laughlin Ore Company; subsequent drilling by this company and the Ford Motor Company showed only minor amounts of radioactive materials at shallow depths in immediate vicinity of surface showings; pitchblende and secondary uranium minerals occur as very small discontinuous stringers and pods in quartz and calcite veinlets with a low-angle shear zone cutting black, locally graphitic slates of the Michigamme slate of Upper Huronian (Precambrian) age; mineralization shows three stages, two hypogene and one supergene, and close association of uranium and

MICHIGAN (contd.)

Baraga County (contd.)
Uranium Occurrences
Huron River, area along East Branch:
copper minerals; deposits resemble some pitchblende deposits of Colorado Front Range but lack the Co-Ni association of the Canadian occurrences: 994.
Huron River in L'Anse area: uranium: 1049.
Huron River area: uranium: 841.
Huron River gorge: uraninite: 267.
Jones and Laughlin Ore Co. property: pitchblende: 1050.
Mohatin Hills mines: carnotite: 840.
Skanee, 7 mi. N of: uranium in vanadium ores: 41.

Bay County
Radioactive Rocks
Well in Sec. 2-T. 14 N-R 4 E: limestone from 2840 ft. depth, radioactivity 3.2 $\pm$ 2.0 x 10^{-12} g. Ra/g. rock; limestone from 3525 ft. depth, radioactivity less than 2 x 10^{-12} g. Ra/g. rock; shaly dolomite containing some black shale from 3920 ft. depth, radioactivity 21.2 $\pm$ 2.5 x 10^{-12} g. Ra/g. rock; calcareous sandstone from 4320 ft. depth, radioactivity less than 2 x 10^{-12} g. Ra/g. rock; Trenton limestone from 9403-12 ft. depth, radioactivity less than 2 x 10^{-12} g. Ra/g. rock; St. Peter claystone from 10,078½ ft. depth, radioactivity 18.3 $\pm$ 1.8 x 10^{-12} g. Ra/g. rock: 929; relationship of radioactivity of sample to organic content and sedimentation studied: 928.

MICHIGAN (contd.)

Black Shales, Uranium-bearing
See under individual county names and under Index III, Black Shales, Uranium-bearing-Michigan: 426, 443, 664, 841.

Carnotite Occurrences
See under individual county names and under Index III, Carnotite Occurrences-Michigan: 840.

Dickinson County
Radioactive Rocks
Felch: discovery of radioactive rocks reported in area by Michigan Department of Conservation; U.S.A.E.C. reported favorably on samples; State Geologist to recommend that 3-year lease be granted for exploration: 1067.
Radioactivity Surveys (Airborne)
General: airborne radioactivity survey showed numerous anomalies, which may be due to the presence of uranium or thorium or both, in Felch township: 970.
Thorium Occurrences
Leitch and Isham No. 2 claim: field examination made for D.M.E.A. of prospect consisting of Archean (?) granite containing a 5-ft. band of biotite schist mineralized by small amounts of U and Th and locally altered to sericite; an unweathered sample of the most radioactive material present showed 0.016% eU and 0.007% U; no further work planned: 994.
Uranium Exploration
General: one of first two Michigan leases for uranium exploration on state-owned land granted to Thad D. Isham and James E. Leitch; 10% royalty to be paid to state from any profits made by these individuals: 1048; reconnaissance geological mapping to be carried on by U.S.A.E.C. during summer field season: 1114.

MICHIGAN (contd.)

Dickinson County (contd.)
Uranium Exploration
Felch: discovery of radioactive rocks reported in area by Michigan Department of Conservation; U.S.A.E.C. reported favorably on samples; State Geologist to recommend that 3-year lease be granted for exploration: 1067.
Uranium Occurrences
General: one of first two Michigan leases for uranium exploration on state-owned land granted to Thad D. Isham and James E. Leitch; 10% royalty to be paid to state from any profits made by these individuals: 1048.
Leitch and Isham No. 2 claim: field examination made for D.M.E.A. of prospect consisting of Archean (?) granite containing a 5-ft. band of biotite schist mineralized by small amounts of U and Th and locally altered to sericite; an unweathered sample of the most radioactive material present showed 0.016% eU and 0.007% U; no further work planned: 994.

Geophysical Exploration (Airborne)
See under individual county names and under Index III, Geophysical Exploration (Airborne)-Michigan: 722, 970, 1052.

Geophysical Exploration (Ground)
See under individual county names and under Index III, Geophysical Exploration (Ground)-Michigan: 1014.

Gogebic County
Radioactive Occurrences
General: no abnormal radioactivity detected associated with several lead, zinc, copper, and silver prospects examined in Marquette and Gogebic Counties although copper and zinc minerals are associated with pitchblende in Baraga and Iron Counties: 995.

MICHIGAN (contd.)

Gogebic County (contd.)
Radioactive Rocks
Gogebic Range
General: helium and radioactivity data for trap rock, 1.82×10^{-5} cc. He/g., 1.40×10^{-13} g. Ra/g., 1.72×10^{-6} g. Th/g., and 0.30 alpha/mg./hr.: 798; two specimens of trap from Gogebic Range, mean value of radioactivity 0.10 +- 0.02 alpha/mg./hr. for activity index of first and 0.04 +- 0.01 alpha/mg./hr. for activity index of second: 745; radioactivity determinations on two samples of pre-Ordovician basic rock gave 2.40 and 1.01×10^{-5} cc. He/g., 0.53 and 0.30×10^{-13} g. Ra/g., 0.53 and 0.19×10^{-6} g. Th/g., age 665 (?) and 605 m.y.: 746.
Brotherton mine, 26th level: radioactivity determinations on trap dike cutting upper phase of the Palms (Huronian) gave 1.78×10^{-5} cc. He/g., 1.4×10^{-13} g. Ra/g., 1.72×10^{-6} g. Th/g., age 175 +- 25 m.y.: 746; radioactivity determinations on sample of Upper Huronian basic rock gave 0.68×10^{-5} cc. He/g., 0.21×10^{-13} g. Ra/g., 0.20×10^{-6} g. Th/g., age 498 m.y.: 746; trap rock from Gogebic Range taken from 26th level of mine, mean value of radioactivity 0.16 +- 0.03 alpha/mg./hr. for activity index; a different radioactivity study showed 0.14×10^{-12} g. Ra/g. rock, activity index 0.30 alpha/mg./hr., 0.40×10^{-6} g. U/g. rock, 1.72×10^{-6} g. Th/g. rock, and Th/U ratio 4.3: 745.
Mikado mine at Wakefield: trap rock from Gogebic Range sill from drillhole C-18, 105-110 ft. below collar, mean value of radioactivity 0.62 +- 0.06 alpha/mg./hr. for activity index, 0.91 +- 0.17×10^{-6} g. U/g. rock, 3.2 +- 0.3×10^{-6} g. Th/g. rock, and Th/U ratio 3.5: 745; trap rock from Gogebic Range sill from drillhole G-48, 855-860 ft. below collar, mean value of radioactivity 1.83 +- 0.22 alpha/mg./hr. for activity index, 1.3 +- 0.2×10^{-6}

MICHIGAN (contd.)

Gogebic County (contd.)
Radioactive Rocks
Gogebic Range
Mikado mine at Wakefield: g. U/g. rock, 15.0 +- 3.0×10^{-6} g. Th/g. rock, and Th/U ratio 11.5: 745.
Thorium Occurrences
Gogebic Range
General: helium and radioactivity data for trap rock, 1.82×10^{-5} cc. He/g., 1.40×10^{-13} g. Ra/g., 1.72×10^{-6} g. Th/g., and 0.30 alpha/mg./hr.: 798; radioactivity determinations on two samples of pre-Ordovician basic rock gave 2.40 and 1.01×10^{-5} cc. He/g., 0.53 and 0.30×10^{-13} g. Ra/g., 0.53 and 0.19×10^{-6} g. Th/g., age 665 (?) and 605 m.y.: 746.
Brotherton mine, 26th level: radioactivity determinations on trap dike cutting upper phase of the Palms (Huronian) gave 1.78×10^{-5} cc. He/g., 1.4×10^{-13} g. Ra/g., 1.72×10^{-6} g. Th/g., age 175 +- 25 m.y.: 746; radioactivity determinations on sample of Upper Huronian basic rock gave 0.68×10^{-5} cc. He/g., 0.21×10^{-13} g. Ra/g., 0.20×10^{-6} g. Th/g., age 498 m.y.: 746; trap rock from Gogebic Range taken from 26th level of mine, mean value of radioactivity 0.16 +- 0.03 alpha/mg./hr. for activity index; a different radioactivity study showed 0.14×10^{-12} g. Ra/g. rock, activity index of 0.30 alpha/mg./hr., 0.40×10^{-6} g. U/g. rock, 1.72×10^{-6} g. Th/g. rock, and Th/U ratio 4.3: 745.
Mikado mine at Wakefield: trap rock from Gogebic Range sill from drillhole C-18, 105-110 ft. below collar, mean value of radioactivity 0.62 +- 0.06 alpha/mg./hr. for activity index, 0.91 +- 0.17×10^{-6} g. U/g. rock, 3.2 +- 0.3×10^{-6} g. Th/g. rock, and Th/U ratio 3.5: 745;

MICHIGAN (contd.)

Gogebic County (contd.)

Thorium Occurrences

Gogebic Range

Mikado mine at Wakefield: trap rock from Gogebic Range sill from drillhole G-48 855-860 ft. below collar, mean value of radioactivity 1.83 +- 0.22 alphas/mg./hr. for activity index, 1.3 +- 0.2 x 10^{-6} g. U/g. rock, 15.0 +- 3.0 x 10^{-6} g. Th/g. rock, and Th/U ratio 11.5: 745.

Uranium Exploration

General: systematic Geiger counter survey of plutons to be made by Michigan College of Mining and Technology during summer field season: 1114.

Uranium Occurrences

Gogebic Creek: one of four potential uranium occurrences in Upper peninsula; no deposits of commercial importance found there yet: 1044.

Gogebic Range

Brotherton mine: trap rock from Gogebic Range taken from 26th level of mine, mean value of radioactivity 0.16 +- 0.03 alpha/mg./hr., for activity index; a different radioactivity study showed 0.14 x 10^{-12} g. Ra/g. rock, activity index of 0.30 alpha/mg./hr., 0.40 x 10^{-6} g. U/g. rock, 1.72 x 10^{-6} g. Th/g. rock, and Th/U ratio 4.3: 745.

Mikado mine at Wakefield: trap rock from Gogebic Range sill from drillhole G-18 105-110 ft. below collar, mean value of radioactivity 0.62 +- 0.06 alpha/mg./hr. for activity index, 0.91 +- 0.17 x 10^{-6} g. U/g. rock, 3.2 +- 0.3 x 10^{-6} g. Th/g. rock, and Th/U ratio 3.5: 745; trap rock from Gogebic Range sill from drillhole G-48 855-860 ft. below collar, mean value of radioactivity 1.83 +- 0.22 alpha/mg./hr. for activity index, 1.3 +- 0.2 x 10^{-6} g. U/g. rock, 15.0 +- 3.0 x 10^{-6} g. Th/g. rock, and Th/U ratio 11.5: 745.

Watersmeet, Area N of: one of four potential uranium occurrences in Upper Peninsula; no deposits of commercial importance found there yet: 1044.

MICHIGAN (contd.)

Houghton County

Iron Deposits, Uranium-bearing

Champion mine: uranium reported for first time in iron formation; samples from dumps of abandoned iron mine checked chemically by U.S.A.E.C. and tests showed the radioactivity came from the iron; old mine workings now inaccessible but seem to warrant further exploration: 1066.

Radioactive Minerals

Baltic mine dump: chalcocite from fissure in Baltic lode, radioactivity was 0.10 x 10^{-13} g. Ra/g. mineral: 991.

Baltic mine, No. 2 dump, chalcocite: radioactivity determinations (approximate) gave 0.408 x 10^{-5} cc. He/g., 1.0 x 10^{-13} g. Ra/g., age 120 m.y.: 992.

Copper City dump, Site of old: prehnite with finely divided crystals of bornite and arsenides: radioactivity determinations on prehnite gave 0.187 x 10^{-5} cc. He/g., 0.34 x 10^{-13} g. Ra/g., age 165 m.y.: 992.

Radioactive Rocks

Calumet and Hecla collection

Mesnard Epidote from Tamarack mine at 500 ft. vertical: radioactivity determinations in two experiments gave respectively 3.30 and 3.35 x 10^{-5} cc. He/g., 9.93 and 8.56 x 10^{-13} g. Ra/g., age 100 and 117 m.y.: 992.

Fissure arsenide from Mohawk mine: radioactivity determinations (30% accuracy) gave 0.385 x 10^{-5} cc. He/g., 0.55 x 10^{-13} g. Ra/g., age 210 m.y.: 992.

Calumet and Hecla mine: radioactivity of six specimens of Middle Keweenawan basalt was: 0.71, 4.16, 2.45, 0.57, 0.74, 7.00 x 10^{-13} g. Ra/g. rock; these specimens were taken from different shafts and showed increased radioactivity at greater depth: 991.

MICHIGAN (contd.)

Houghton County (contd.)
Radioactive Rocks
Calumet and Hecla No. 12 Shaft, Level 78
Calumet conglomerate: radioactivity determinations on conglomerate gave 24.78 x 10^{-5} cc. He/g., 14.05 x 10^{-13} g. Ra/g., age 530 m.y.: 992.
Crosscut at bottom of thick ophite flow, draft mark 505: radioactivity determinations on ophite flow gave 2.37 x 10^{-5} cc. He/g., 0.69 x 10^{-13} g. Ra/g., age 1030 m.y.: 992.
Crosscut at top of thick ophite flow 15 ft. below the amygdaloid: radioactivity determinations on ophite flow gave 2.74 x 10^{-5} cc. He/g., 0.82 x 10^{-13} g. Ra/g., age 1000 m.y.: 992.
Hanging trap to Kearsarge lode: radioactivity determinations on trap gave 9.37 x 10^{-5} cc. He/g., 4.20 x 10^{-13} g. Ra/g., 5 x 10^{-6} g. Th/g., age 670 m.y. based on Ra alone and 345 m.y. based on Ra and Th: 992.
Kearsarge lode: radioactivity determinations on the original lava gave 2.40 x 10^{-5} cc. He/g., 3.06 x 10^{-13} g. Ra/g., age 236 m.y.: 992.
Centennial mine, at 114 ft. in footwall to Kearsarge lode: radioactivity determinations in 1934 and 1938 on rock sample gave 6.82 and 7.11 x 10^{-5} cc. He/g., 5.81 and 8.28 x 10^{-13} g. Ra/g., 1.67 and 2.15 x 10^{-6} g. Th/g., age 270 and 205 m.y.; in an earlier paper where radium value was given as 2.44 x 10^{-13} g. Ra/g., age was 490 m.y.: 746.
Centennial shaft, Level 1, Hanging trap to Kearsarge lode: radioactivity determinations on trap gave 1.98 x 10^{-5} cc. He/g., 0.94 x 10^{-13} g. Ra/g., age 630 m.y.: 992.
Champion mine: radioactivity of three specimens of Early Keweenawan fine-grained basalt was 0.33, 0.90, and 2.62 x 10^{-13} g. Ra/g. rock; all three occur in same flow immediately above the amygdaloidal lode being worked for copper: 991.

MICHIGAN (contd.)

Houghton County (contd.)
Radioactive Rocks
Champion mine
No. 1 Shaft
Level 38, Hanging trap: radioactivity determinations on trap gave 11.73 x 10^{-5} cc. He/g., 3.80 x 10^{-13} g. Ra/g., 5 x 10^{-6} g. Th/g., age 925 m.y. based on Ra only and 455 m.y. based on Ra and Th: 992.
Level 21, Hanging trap: radioactivity determinations on trap gave 4.91 x 10^{-5} cc. He/g., 1.35 x 10^{-13} g. Ra/g., age 1090 m.y.: 992.
No. 4 Shaft
Level 3, Hanging trap: radioactivity determinations on trap gave 1.90 x 10^{-5} cc. He/g., 0.46 x 10^{-13} g. Ra/g., age 1240 m.y.: 992.
Copper City dump, Site of old: prehnite with finely divided crystals of bornite and arsenides: radioactivity determinations on prehnite gave 0.187 x 10^{-5} cc. He/g., 0.34 x 10^{-13} g. Ra/g., age 165 m.y.: 992.
Quincy mine: radioactivity of two specimens of Late Keweenawan medium-grained basalt was 1.18 and 0.70 x 10^{-13} g. Ra/g. rock; close correlation of radium content not possible here because amygdaloidal lodes are thin flows, also no indication of increase in radium content at depth: 991.

MICHIGAN (contd.)

Houghton County (contd.)

Radioactive Rocks

Quincy mine shaft No. 2

Level 91, Hanging trap: radioactivity determinations in two experiments on trap gave respectively 38.98 and 39.34 x 10^{-5} cc. He/g., 1.31 and 1.26 x 10^{-13} g. Ra/g., about 4.2 x 10^{-5} g. Th/g. in both, age 8900 and 9365 m.y. based on Ra alone and 360 and 365 m.y. based on Ra and Th, and a third set of determinations gave no He result, 1.55 x 10^{-13} g. Ra/g., age 7610 m.y.: 992.

Level 7, Hanging trap: radioactivity determinations on trap gave 2.38 x 10^{-5} cc. He/g., 1.88 x 10^{-13} g. Ra/g., age 380 m.y.: 992.

Tamarack mine: radioactivity of specimen of Mesnard Epidote, a somewhat altered volcanic ash at the horizon of the Chippewa felsite, was 4.71 x 10^{-13} g. Ra/g. and 13.85 x 10^{-7} eU content; specimen was collected in a cross-cut 500 ft. vertically below the surface: 991.

Age Determinations

Champion mine lode on Keweenaw Point: study of the amygdules of the amygdaloid sample No. 6 from the 38th level of this mine gave much higher values by the helium method than the rest of the rock, although it had not been considered likely that the helium ratio would give too great an age; this lesser age agrees fairly well with that of sample No. 5, which comes from 5 ft. above No. 6 in the immediately overlying trap; the extra He may have come from the decay beyond recognition, in 500 m.y., of a little Ra contained in the calcite with which the amygdules are filled: 829.

MICHIGAN (contd.)

Houghton County (contd.)

Thorium Occurrences

Calumet and Hecla No. 12 shaft, Level 78

Hanging trap to Kearsarge lode: radioactivity determinations on trap gave 9.37 x 10^{-5} cc. He/g., 4.20 x 10^{-13} g. Ra/g., 5 x 10^{-6} g. Th/g., age 670 m.y. based on Ra alone and 345 m.y. based on Ra and Th: 992.

Champion mine, No. 1 shaft

Level 38, Hanging trap: radioactivity determinations on trap gave 11.73 x 10^{-5} cc. He/g., 3.80 x 10^{-13} g. Ra/g., 5 x 10^{-6} g. Th/g., age 925 m.y. based on Ra only and 455 m.y. based on Ra and Th: 992.

Quincy mine shaft No. 2

Level 91, Hanging trap: radioactivity determinations in two experiments on trap gave respectively 38.98 and 39.94 x 10^{-5} cc. He/g., 1.31 and 1.26 x 10^{-13} g. Ra/g., about 4.2 x 10^{-5} g. Th/g. in both, age 8900 and 9365 m.y. based on Ra alone and 360 and 365 m.y. based on Ra and Th; a third set of determinations gave no He result, 1.55 x 10^{-13} g. Ra/g., age 7610 m.y.: 992.

Uranium Occurrences

Champion mine: uranium reported for first time in iron formation; samples from dumps of abandoned iron mine checked chemically by U.S.A.E.C. and tests showed the radioactivity came from the iron; old mine workings now inaccessible but seem to warrant further exploration: 1066.

MICHIGAN (contd.)

Houghton County (contd.)
Uranium Occurrences
Iron Deposits, Uranium-bearing
Champion mine: uranium reported for first time in iron formation; samples from dumps of abandoned iron mine checked chemically by U.S.A.E.C. and tests showed the radioactivity came from the iron; old mine workings now inaccessible but seem to warrant further exploration: 1066.

Iron County
Pitchblende Occurrences
Iron River District
Sherwood mine: pitchblende associated with copper and zinc minerals: 995.
Radioactive Rocks
Granite specimen from Prof. Willis Seaman: radioactivity determinations on late granite gave 2.49×10^{-5} cc. He/g., 8.20×10^{-13} g. Ra/g., age 91 m.y.: 992.
Hemlock Crystal Falls: radioactivity determinations by two experiments on unnamed specimen gave respectively 0.943 and 1.23×10^{-5} cc. He/g., 0.91 and 1.43×10^{-13} g. Ra/g., age 311 and 258 m.y.: 992.
McCutcheon Creek: small primary (?) uranium concentrations were found in granite gneiss and a secondary uranium mineral coating fractures in the gneiss, was identified as rutherfordine; both granite and granite gneiss in area abnormally radioactive and local high scintillation counts were detectable over an outcrop area several acres in extent; these and other abnormally radioactive localities reported in area will be investigated further: 996.
Rutherfordine Occurrences
McCutcheon Creek: small primary (?) uranium concentrations were found in granite gneiss and a secondary uranium mineral coating fractures in the gneiss, was identified as rutherfordine; both granite and granite gneiss in area abnormally

MICHIGAN (contd.)

Iron County (contd.)
Rutherfordine Occurrences
McCutcheon Creek: radioactive and local high scintillation counts were detectable over an outcrop area several acres in extent; these and other abnormally radioactive localities reported in area will be investigated further: 996.
Thorium Occurrences
Iron River District
Sherwood mine: pitchblende associated with copper and zinc minerals: 995.
Uranium Occurrences
Iron River District
Sherwood mine: pitchblende associated with copper and zinc minerals: 995.
McCutcheon Creek: small primary (?) uranium concentrations were found in granite gneiss and a secondary uranium mineral coating fractures in the gneiss, was identified as rutherfordine; both granite and granite gneiss in area abnormally radioactive and local high scintillation counts were detectable over an outcrop area several acres in extent; these and other abnormally radioactive localities reported in area will be investigated further: 996.

Iron Deposits, Uranium-bearing
See under individual county names and under Index III, Iron Deposits, Uranium-bearing-Michigan: 883, 1066.

MICHIGAN (contd.)

Keweenaw County

Radioactive Minerals

Keweenaw Point, Upper Peninsula

Ahmeek mine: algodonite, a copper arsenide, from Mohawk fissure, radioactivity was 0.08 x 10^{-13} g. Ra/g. mineral; domeykite, a copper arsenide, from Mohawk fissure, radioactivity was 0.13 x 10^{-13} g. Ra/g. mineral: 991.

Ahmeek mine dump: prehnite contained disseminated copper, radioactivity was 0.18 x 10^{-13} g. Ra/g. mineral and equivalent U content, 0.53 x 10^{-7}: 991.

Copper Falls mine dump: datolite from Owl Creek fissure contained microscopically disseminated copper, radioactivity was 1.10 x 10^{-13} g. Ra/g. mineral and equivalent U content, 3.24 x 10^{-7}: 991.

Radioactive Rocks

Keweenaw Point, Upper Peninsula

A late granite: radioactivity was 4.21 x 10^{-13} g. Ra/g. rock and equivalent uranium content, 12.38 x 10^{-7}: 991.

Ahmeek mine: radioactivity determinations in 1934 and 1938 on a fine-grained sample of rock gave 5.36 and 4.38 x 10^{-5} cc. He/g., 2.68 and 2.76 x 10^{-13} g. Ra/g., 1.73 and 0.90 x 10^{-6} g. Th/g., age 365 and 355 m.y.; in an earlier paper where radium value was given as 1.15 x 10^{-13} g. Ra/g., age was 555 m.y.: 746.

Ahmeek dump No. 4, arsenides: radioactivity determinations (30% accuracy) on arsenides gave 0.134 x 10^{-5} cc. He/g., 0.65 x 10^{-13} g. Ra/g., age 62 m.y.: 992.

The Ashbed: the Owl Creek riverbed specimen of Late Keweenawan fine-grained basalt was a surface specimen and radioactivity was 1.54 x 10^{-13} g. Ra/g. rock: 991.

Basalt flows intermediate between the Middle and Late Keweenawan flows: 991.

MICHIGAN (contd.)

Keweenaw County (contd.)

Radioactive Rocks

Keweenaw Point, Upper Peninsula

Copper Falls mine, Owl Creek fissure, datolite with finely divided copper, surface specimen from dump: radioactivity determinations on datolite gave 1.15 x 10^{-5} cc. He/g. 2.19 x 10^{-13} g. Ra/g., age 158 m.y.: 992.

Duluth gabbro: radioactivity was 0.69 x 10^{-13} g. Ra/g. rock and equivalent uranium content, 2.03 x 10^{-7}: 991.

The Greenstone: specimen collected at surface above the North Cliff mine, came from about 100 ft. up in the flow, and, radioactivity was 1.22 x 10^{-13} g. Ra/g. rock: 991; specimen collected at the surface but came from the Phoenix mine about 4 feet from the bottom of the flow, radioactivity was 0.88 x 10^{-13} g. Ra/g. rock: 991.

North Cliff mine, greenstone, freshly exposed surface specimen: radioactivity determinations on greenstone gave 2.41 x 10^{-5} cc. He/g., 1.58 x 10^{-13} g. Ra/g., age 460 m.y.: 992.

Owl Creek riverbed, Hanging trap to ashbed amygdaloid lode, surface specimen: radioactivity determinations on trap gave 6.46 x 10^{-5} cc. He/g., 2.93 x 10^{-13} g. Ra/g., age 660 m.y.: 992.

Phoenix mine, greenstone, finer grained than that at North Cliff mine and nearly on the contact: radioactivity determinations on greenstone gave 1.60 x 10^{-5} cc. He/g., 0.97 x 10^{-13} g. Ra/g., age 495 m.y.: 992.

MICHIGAN (contd.)

Marquette County

Monazite Occurrences

General: monazite in Precambrian Goodrich quartzite: 841; monazite-rich quartzite in Upper Peninsula: 883.

Area in N½ Sec. 20, T. 47 N., R. 27 W., about 5 mi. NW of Palmer: outcrop of Goodrich quartzite gave highest radioactivity outside the Palmer area (0.05 mr./hr., background 0.02 mr./hr.) and a few grains of monazite were identified in thin sections: 1116.

Gwinn area, 12 mi. SE of Palmer: quartzite correlative with the Goodrich occurs in an outlier of Upper Huronian rock and exhibited abnormal radioactivity; re-examination showed several local concentrations of monazite in a coarse arkosic quartzite that overlies and grades down into a granite porphyry; samples from the locality contained as much as 9 lbs. monazite per ton but a scintillation-counter survey of outcrops showed the monazite concentrations were of a very local extent: 1116.

Palmer area: monazite concentrated in pebble conglomerate beds up to one foot thick in Goodrich quartzite as indicated by geologic mapping, sampling, and gamma-ray logging of diamond drill holes, with these beds containing as much as 5% monazite; gamma-ray logging of three drill holes penetrating the Goodrich showed that the most radioactive part is 400 ft. stratigraphically above the base; channel samples taken of all known outcrops of the Goodrich, which are limited to lower 300 ft., had an average monazite content of 0.4%; grade indicated by logging is not known yet but an attempt is being made to correlate the logs in terms of actual monazite content: 995.

MICHIGAN (contd.)

Marquette County (contd.)

Monazite Occurrences

Palmer area, 3 mi. S. of Negaunee on Michigan Route M-35: down-faulted block of Precambrian sedimentary rocks on south limb of the Marquette synclinorium, about 4 mi. long and 0.75 mi. wide, composed mostly of Ajibik quartzite, Negaunee iron-formation, and Goodrich quartzite: 1116; monazite occurs in the Goodrich quartzite as rounded detrital grains concentrated in the matrix of the quartz pebble conglomerate which is interbedded with coarse-grained quartzite: 1116; chemical analyses of two monazite samples, of which the first was more magnetic than the second, gave 47.9 and 46.0% total rare earth oxides, 7.6 and 7.4% ThO_2, and 0.18 and 0.17% U; spectrographic analysis of the same samples gave 5-10% Th in each but showed no U: 1116; the inferred reserves of monazite-bearing quartzite are: 50,000,000 t. rock, 250,000 t. monazite, 10 lbs. monazite per ton, 450 total t. U, 18,700 total t. Th, and 117,000 total t. rare earths: 1116; gamma-ray logging of drillholes cutting the Goodrich quartzite on property of the Cleveland-Cliffs Iron Co. showed that most of the radioactivity of the quartzite occurs more than 300 ft. from the base of the formation; sharp peaks of the gamma-ray logs are interpreted as being caused by relatively thin beds of monazite-bearing pebble conglomerate which contained from 20 to 160 lbs. monazite and were separated by beds of coarse quartzite ranging in thickness from a few inches to a few feet: 1116.

MICHIGAN (contd.)

Marquette County (contd.)

Monazite Occurrences

Palmer Area

Maitland mine: abnormal radioactivity was detected in 1951 in specimens of Goodrich quartzite from the rock dumps; analyses of the rock showed that most of the radioactivity was caused by thorium so no further sampling was done; the locality was checked again in 1952 and subsequent chemical and spectrographic analyses showed that the Goodrich quartzite contained locally as much as 0.37% thoria and 0.X% each of Ce, La, Nd, Y, and Zr, because of the monazite content of the matrix of the pebble conglomerate: 1116.

Old Volunteer mine: abnormal radioactivity was detected in 1951 in specimens of Goodrich quartzite from the rock dumps, analyses of the rock showed that most of the radioactivity was caused by thorium so no further sampling was done; the locality was checked again in 1952 and subsequent chemical and spectrographic analyses showed that the Goodrich quartzite contained locally as much as 0.37% thoria and 0.X% each of Ce, La, Nd, Y, and Zr, because of the monazite content of the matrix of the pebble conglomerate: 1116.

Radioactive Occurrences

General: no abnormal radioactivity detected associated with several lead, zinc, copper, and silver prospects examined in Marquette and Gogebic Counties although copper and zinc minerals are associated with pitchblende occurrences in Baraga and Iron Counties: 995.

Republic at Pegmatite Knob in Marquette District: unidentified mineral in granite caused high count on Geiger counter; other locations examined in Upper Peninsula showed no radioactivity when checked with the Geiger counter: 805.

MICHIGAN (contd.)

Marquette County (contd.)

Radioactive Rocks

Marquette trough: scintillation-counter surveys of the Goodrich quartzite at the Blueberry mine, Goodrich mine, Humbolt mine, the city of Ishpeming, and the Michigamme area, showed only slightly abnormal radioactivity: 1116.

Radioactivity Survey (Airborne)

General: airborne radioactivity survey gave numerous anomalies, which may be due to the presence of uranium or thorium or both, found in greatest abundance in Humboldt and Republic townships and also present in Richmond, Tilden, Forsyth, Ely, Michigamme, Ishpeming, Negaunee, and Powell townships: 970.

Thorium Occurrences

General: monazite-rich quartzite in Upper Peninsula: 883; monazite in Precambrian Goodrich quartzite: 841.

Area in N½ Sec. 20, T. 47 N., R. 27 W., about 5 mi. NW of Palmer: outcrop of Goodrich quartzite gave highest radioactivity outside the Palmer area (0.05 mr./hr., background 0.02 mr./hr.) and a few grains of monazite were identified in thin sections: 1116.

Gwinn area, 12 mi. SE of Palmer: quartzite correlative with the Goodrich occurs in an outlier of Upper Huronian rock and exhibited abnormal radioactivity; re-examination showed several local concentrations of monazite in a coarse arkosic quartzite that overlies and grades down into a granite porphyry; samples from the locality contained as much as 9 lbs. monazite per ton but a scintillation-counter survey of outcrops showed the monazite concentrations were of a very local extent: 1116.

MICHIGAN (contd.)

Marquette County (contd.)
Thorium Occurrences
Palmer area: monazite concentrated in pebble conglomerate beds up to one foot thick in Goodrich quartzite as indicated by geologic mapping, sampling, and gamma-ray logging of diamond drill holes, with these beds containing as much as 5% monazite; gamma-ray logging of three drill holes penetrating the Goodrich showed that the most radioactive part is 400 ft. stratigraphically above the base; channel samples taken of all known outcrops of the Goodrich, which are limited to lower 300 ft., had an average monazite content of 0.4%; grade indicated by logging is not known yet but an attempt is being made to correlate the logs in terms of actual monazite content: 995.
Palmer area, 3 mi. S of Negaunee on Michigan Route M-35: down-faulted block of Precambrian sedimentary rocks on south limb of the Marquette synclinorium, about 4 mi. long and 0.75 mi. wide, composed mostly of Ajibik quartzite, Negaunee iron-formation, and Goodrich quartzite: 1116; monazite occurs in the Goodrich quartzite as rounded detrital grains concentrated in the matrix of the quartz pebble conglomerate which is interbedded with coarse-grained quartzite: 1116; chemical analyses of two monazite samples, of which the first was more magnetic than the second, gave 47.9 and 46.0% total rare earth oxides, 7.6 and 7.4% ThO_2, and 0.18 and 0.17% U; spectrographic analysis of the same samples gave 5-10% Th in each but showed no U: 1116; the inferred reserves of monazite-bearing quartzite are: 50,000,000 t. rock, 250,000 t. monazite, 10 lbs. monazite per ton, 450 total t. U, 18,700 total t. Th, and 117,000 total t. rare earths: 1116;

MICHIGAN (contd.)

Marquette County (contd.)
Thorium Occurrences
Palmer area, 3 mi. S of Negaunee on Michigan Route M-35: gamma-ray logging of drill-holes cutting the Goodrich quartzite on property of the Cleveland-Cliffs Iron Co. showed that most of the radioactivity of the quartzite occurs more than 300 ft. from the base of the formation; sharp peaks of the gamma-ray logs are interpreted as being caused by relatively thin beds of monazite-bearing pebble conglomerate which contained from 20 to 160 lbs. monazite and were separated by beds of coarse quartzite ranging in thickness from a few inches to a few feet: 1116.
Palmer Area
Maitland mine: abnormal radioactivity was detected in 1951 in specimens of Goodrich quartzite from the rock dumps; analyses of the rock showed that most of the radioactivity was caused by thorium so no further sampling was done; the locality was checked again in 1952 and subsequent chemical and spectrographic analyses showed that the Goodrich quartzite contained locally as much 0.37% thoria and 0.X% each of Ce, La, Nd, Y, and Zr, because of the monazite content of the matrix of the pebble conglomerate: 1116.
Old Volunteer mine: abnormal radioactivity was detected in 1951 in specimens of Goodrich quartzite from the rock dumps; analyses of the rock showed that most of the radioactivity was caused by thorium so no further sampling

MICHIGAN (contd.)

Marquette County (contd.)
Thorium Occurrences
Palmer Area
Old Volunteer mine:
was done; the locality was checked again in 1952 and subsequent chemical and spectrographic analyses showed that the Goodrich quartzite contained locally as much as 0.37% thoria and 0.X% each of Ce, La, Nd, Y, and Zr, because of the monazite content of the matrix of the pebble conglomerate: 1116.

Uranium Exploration
Ernest Hamel farm near Champion: showing of uranium ore uncovered here; further tests considered warranted, so drill was set up; Jones and Laughlin Steel Corp., under joint contract with U.S.A.E.C., to explore for uranium ore: 1064.
Ishpeming: U.S.A.E.C. opens field office to assist prospectors in uranium exploration work in Minnesota, Michigan, and Wisconsin: 1074.
Republic at Pegmatite Knob in Marquette District: unidentified mineral in granite caused high count on Geiger counter; other locations examined in Upper Peninsula showed no radioactivity when checked with the Geiger counter: 805.

Uranium Occurrences
General: uranium in Upper Huronian (?) series, carbonaceous slate and quartzite: 841.
Ernest Hamel farm near Champion: showing of uranium ore uncovered here; further tests considered warranted, so drill was set up; Jones and Laughlin Steel Corp., under joint contract with U.S.A.E.C., to explore for uranium ore: 1064.

MICHIGAN (contd.)

Marquette County (contd.)
Uranium Occurrences
Palmer area, 3 mi. S of Negaunee on Michigan Route M-35: downfaulted block of Precambrian sedimentary rocks on south limb of the Marquette synclinorium, about 4 mi. long and 0.75 mi. wide, composed mostly of Ajibik quartzite, Negaunee iron-formation, and Goodrich quartzite: 1116; monazite occurs in the Goodrich quartzite as rounded detrital grains concentrated in the matrix of the quartz pebble conglomerate which is interbedded with coarse-grained quartzite: 1116; chemical analysis of two monazite samples, of which the first was more magnetic than the second, gave 47.9 and 46.0% total rare earth oxides, 7.6 and 7.4% ThO_2, and 0.18 and 0.17% U; spectrographic analyses of the same samples gave 5-10% Th in each but showed no U: 1116; the inferred reserves of monazite-bearing quartzite are: 50,000,000 t. rock, 250,000 t. monazite, 10 lbs. monazite per ton, 450 total t. U, 18,700 total t. Th, and 117,000 total t. rare earths: 1116; gamma-ray logging of drillholes cutting the Goodrich quartzite on property of the Cleveland-Cliffs Iron Co. showed that most of the radioactivity of the quartzite occurs more than 300 ft. from the base of the formation; sharp peaks of the gamma-ray logs are interpreted as being caused by relatively thin beds of monazite-bearing pebble conglomerate, which contained from 20 to 160 lbs. monazite and were separated by beds of coarse quartzite ranging in thickness from a few inches to a few feet: 1116.

(See also Menominee and Marquette Cos.: 1022)

MICHIGAN (contd.)

Menominee County

See Menominee and Marquette Cos.: 1022.

Menominee & Marquette Counties

Allanite Occurrences

Johnson Logging Camp N of Teal Lake: allanite: 1022.

Horse Race Rapid: allanite: 1022.

Thorium Occurrences

Johnson Logging Camp, N of Teal Lake: allanite: 1022.

Horse Race Rapid: allanite: 1022.

Monazite Occurrences

See under individual county names and under Index III, Thorium Occurrences-Michigan: 841, 883, 995, 1116.

Northern Peninsula

Geophysical Exploration (Airborne)

General: airborne radioactivity survey made by U.S.G.S. over an area of 1600 miles in the central part of Northern Peninsula in 1950 as part of cooperative program with U.S.A.E.C.; traverses flown north-south at about 500 ft. at quarter-mile intervals with Geiger counter equipment mounted in a Douglas DC-3A airplane: 970.

U.S.G.S. surveys: traverses flown at 500 ft. above the ground; radioactive anomalies, located by airborne Geiger counter, do not necessarily indicate presence of uranium in commercial quantities: 1052.

Radioactivity Survey (Airborne)

General: airborne radioactivity survey made by U.S.G.S. over an area of 1600 miles in the central part of Northern Peninsula in 1950 as part of cooperative program with U.S.A.E.C.; traverses flown north-south at about 500 ft. at quarter-mile intervals with Geiger counter equipment mounted in a Douglas DC-3A airplane: 970.

MICHIGAN (contd.)

Northern Peninsula (contd.)

Radioactive Survey (Airborne)

Interpretation of Radioactivity Anomalies: presence of an anomaly recorded by airborne measurement at 500 ft. above the ground may be caused by 1) moderately large area where the rocks and soils are slightly more radioactive than normal rocks and soils of whole area; 2) smaller area in which rocks and soils are considerably more radioactive than normal rocks and soils in whole area; 3) very small area in which rocks and soils are highly radioactive; any given anomaly, therefore, may represent slightly greater-than-average activity over a distance of 1000 ft. or more, or high radioactivity over a distance of a few tens of feet, but, as shown on a map, means only that the locality represented is more radioactive than the surrounding area; no attempt is made here to check the anomalies by a ground radioactivity survey or to interpret the relationship between the anomalies and the geologic data: 970.

Uranium Exploration

Geophysical Exploration (Airborne)

General: airborne radioactivity survey made by U.S.G.S. over an area of 1600 miles in the central part of Northern Peninsula in 1950 as part of cooperative program with U.S.A.E.C.; traverses flown north-south at about 500 ft. at quarter-mile intervals with Geiger counter equipment mounted in a Douglas DC-3A airplane: 970.

MICHIGAN (contd.)

North Peninsula (contd.)
Uranium Exploration
Geophysical Exploration (Airborne)
U.S.G.S. surveys: traverses flown at 500 ft. above the ground; radioactive anomalies, located by airborne Geiger counter, do not necessarily indicate presence of uranium in commercial quantities: 1052.
Uranium Occurrences
U.S.G.S. surveys (airborne): traverses flown at 500 ft. above the ground; radioactive anomalies, located by airborne Geiger counter, do not necessarily indicate presence of uranium in commercial quantities: 1052.

Ontonagon County
Uranium Exploration
General: systematic Geiger counter survey of plutons to be made by Michigan College of Mining and Technology during summer field season: 1114.
Uranium Occurrences
Bergland, Area N of: one of four potential uranium occurrences in Upper Peninsula; no deposits of commercial importance found there yet: 1044.
Porcupine Mountains: one of four potential uranium occurrences in Upper Peninsula; no deposits of commercial importance found there yet: 1044.

Osceola County
Black Shales, Uranium-bearing
Gingrich No. 3 well of the Pure Oil Co. in Sec. 30, T. 18 N, R. 10 W: radioactivity determinations were made on well cuttings, which were analyzed for uranium content, carbon, hydrogen, total alpha activity, and total beta activity; in some cases the potassium content was determined by chemical analysis: 664;

MICHIGAN (contd.)

Osceola County (contd.)
Black Shales, Uranium-bearing
Gingrich No. 3 well of the Pure Oil Co. in Sec. 30, T. 18 N, R. 10 W: results of measurements on various rocks found in the well are as follows: i. Coldwater shale at depths of 2,144-2,147 ft., gave 14.7 +/- 1.2 total alphas/minute/g., and values of 10.0 U and 4.7 Th; 3.75 +/- 0.39 total betas/minute/g., and values of 3.17 K, 0.39 U, and 0.19 Th: 664; ii. Red Rock at depths of 2,147 - 2,162 ft., gave 13.9 +/- 0.5 total alphas/minute/g., and values of 7.8 U and 4.7 Th; 1.54 +/- 0.01 total betas/minute/g., and values of 1.22 K, 0.18 U, and 0.14 Th: 664; iii. Sunbury black shale, which has 95% dark gray to black shale with some pyrite and 2% carbon, at a depth of 2,163-ft., gave 52.4 +/- 0.8 total alphas/minute/g., and values of 25.6 U and 26.8 Th; 8.96 +/- 0.01 total betas/minute/g., and values of 6.42 K, 1.51 U, and 1.03 Th: 664; iv. Antrim black shale, which has almost 100% black shale and 5-10% carbon or several times that of the Sunbury black shale, at a depth of 2,738-2,945 ft., gave 404.1 +/- 12.2 total alphas/minute/g., and values of 148.8 U and 255.3 Th; 21.4 total betas/minute/g., and values of 9.63 K, 8.97 U, and 2.80 Th: 664; v. Traverse limestone, which has no carbon and almost no black shale, at depths of 2,967 - ft., gave 5.2 +/- 1.4 total alphas/minute/g., and values of 4.7 U and 0.5 Th; 1.15 total betas/minute/g., and values of 0.73 K, 0.36 U, and 0.06 Th: 664; Sunbury and Antrim black shales showed excellent correlation of uranium and carbon content: 664;

MICHIGAN (contd.)

Osceola County (contd.)

Black Shales, Uranium-bearing

Gingrich No. 3 well of the Pure Oil Co. in Sec. 30, T. 18 N, R. 10 W: geological discussion of the evolution of Paleozoic source beds and of black shales, the relationship of radioactivity and organic content, the role of potassium, origin of the black shale, and other related problems: 664.

Radioactive Rocks

Well in Sec. 30-T. 18 N, R 10 W: Dundee limestone sample from 3463½ ft. depth, radioactivity less than 2 x 10^{-12} g. Ra/g. rock: 929; relationship of radioactivity of sample to organic content and sedimentation studied: 928.

Well in Sec. 31-T 18 N, R 10 W: Monroe dolomite sample, with small vein of black material like asphaltite, from 3578 ft. depth, radioactivity 3.6 +- 2.2 x 10^{-12} g. Ra/g. rock: 929; relationship of radioactivity of sample to organic content and sedimentation studied: 928.

Thorium Occurrences

Gingrich No. 3 well of the Pure Oil Co. in Sec. 30, T. 18 N., R 10 W.: results of measurements on various rocks found in the well are as follows: i. Coldwater shale at depths of 2,144-2,147 ft., gave 14.7 +- 1.2 total alphas/minute/g., and values of 10.0 U and 4.7 Th; 3.75 +- 0.39 total betas/minute/g., and values of 3.17 K, 0.39 U, and 0.19 Th: 664; ii. Red Rock at depths of 2,147-2,162 ft. gave 13.9 +- 0.5 total alphas/minute/g., and values of 7.8 U and 4.7 Th; 1.54 +- 0.01 total betas/minute/g., and values of 1.22 K, 0.18 U, and 0.14 Th: 664; iii. Sunbury black shale, which has 95% dark gray to black shale with some pyrite and 2% carbon, at a depth of 2,163-ft., gave 52.4 +- 0.8 total alphas/minute/g., and values of 25.6 U and 26.8 Th; 8.96 +- 0.01 total betas/minute/g., and values of 6.42 K, 1.51 U, and 1.03 Th: 664; iv. Antrim black shale, which has almost 100% black shale and 5-10% carbon or several times that of the Sunbury black shale, at a depth of 2,738-2,945 ft., gave 404.1 +- 12.2 total alphas/minute/g., and values of 148.8 U and 255.3 Th; 21.4 total betas/minute/g., and values of 9.63 K, 8.97 U, and 2.80 Th: 664; v. Traverse limestone, which has no carbon and almost no black shale at depths of 2,967-ft. gave 5.2 +- 1.4 total alphas/minute/g., and values of 4.7 U and 0.5 Th; 1.15 total betas/minute/g., and values of 0.73 K, 0.36 U, and 0.06 Th: 664; Sunbury and Antrim black shales showed excellent correlation of uranium and carbon content: 664; geological discussion of the evolution of Paleozoic source beds and of black shales, the relationship of radioactivity and organic content, the role of potassium, origin of the black shale, and other related problems: 664; radioactivity determinations were made on well cuttings, which were analyzed for uranium content, carbon, hydrogen, total alpha activity, and total beta activity; in some cases the potassium content was determined by chemical analysis: 664.

MICHIGAN (contd.)

Osceola County (contd.)
Thorium Occurrences
Black Shales, Thorium-bearing
Gingrich No. 3 well of the Pure Oil Co. in Sec. 30 T. 18 N., R. 10 W: results of measurements on various rocks found in the well are as follows: i. Coldwater shale at depths of 2,144-2,147 ft. gave 14.7 +- 1.2 total alphas/minute/g., and values of 10.0 Uand 4.7 Th;3.75 +- 0.39 total betas/minute/g., and values of 3.17 K, 0.39 U, and 0.19 Th: 664; ii. Red Rock at depths of 2,147-2,162 ft., gave 13.9 +- 0.5 total alphas/minute/g., and values of 7.8 U and 4.7 Th; 1.54 +- 0.01 total betas/minute/g., and values of 1.22 K, 0.18 U, and 0.14 Th: 664; Sunbury black shale, which has 95% dark gray to black shale with some pyrite and 2% carbon, at a depth of 2,163-ft., gave 52.4 +- 0.8 total alphas/minute/g., and values of 25.6 U and 26.8 Th; 8.96 +- 0.01 total betas/minute/g., and values of 6.42 K, 1.51 U, and 1.03 Th: 664; iv. Antrim black shale, which has almost 100% black shale and 5-10% carbon or several times that of the Sunbury black shale, at a depth of 2,738-2,945 ft., gave 404.1 +- 12.2 total alphas/minute/g., and values of 148.8 U and 255.3 Th; 21.4 total betas/minute/g., and values of 9.63 K, 8.97 U, and 2.80 Th: 664; v. Traverse limestone, which has no carbon and almost no black shale, at depths of 2,967-ft., gave 5.2 +- 1.4 total alphas/minute/g., and values of 4.7 U and 0.5 Th; 1.15 total betas/minute/g., and values of 0.73 K, 0.36 U, and 0.06 Th: 664; Sunbury and Antrim black shales showed excellent correlation of uranium and carbon content: 664;

MICHIGAN (contd.)

Osceola County (contd.)
Thorium Occurrences
Black Shales, Thorium-bearing
Gingrich No. 3 well of the Pure Oil Co. in Sec. 30, T. 18 N., R. 10 W: geological discussion of the evolution of Paleozoic source beds and of black shales, the relationship of radioactivity and organic content, the role of potassium, origin of the black shales, and other related problems: 664; radioactivity determinations were made on well cuttings which were analyzed for uranium content, carbon, hydrogen, total alpha activity, and total beta activity; in some cases the potassium content was determined by chemical analysis: 664.

Uranium Occurrences
Gingrich No. 3 well of the Pure Oil Co. in Sec. 30, T. 18 N., R. 10 W: results of measurements on various rocks found in the well are as follows: i. Coldwater shale at depths of 2,144-2,147 ft., gave 14.7 +- 1.2 total alphas/minute/g., and values of 10.0 U and 4.7 Th; 3.75 +- 0.39 total betas/minute/g., and values of 3.17 K, 0.39 U, and 0.19 Th: 664; ii. Red Rock at depths of 2,147-2,162 ft., gave 13.9 +- 0.5 total alphas/minute/g., and values of 7.8 U and 4.7 Th; 1.54 +- 0.01 total betas/minute/g., and values of 1.22 K, 0.18 U, and 0.14 Th: 664; iii. Sunbury black shale, which has 95% dark gray to black shale with some pyrite and 2% carbon, at a depth of 2,163-ft., gave 52.4 +- 0.8 total alphas/minute/g., and values of 25.6 U and 26.8 Th; 8.96 +- 0.01 total betas/minute/g., and values of 6.42 K, 1.51 U, and 1.03 Th: 664;

MICHIGAN (contd.)

Osceola County (contd.)
Uranium Occurrences
Gingrich No. 3 well of the Pure Oil Co. in Sec. 30, T. 18 N., R. 10 W: iv. Antrim black shale, which has almost 100% black shale and 5-10% carbon or several times that of the Sunbury black shale, at a depth of 2,738-2,945 ft., gave 404.1 +- 12.2 total alphas/minute/g., and values of 148.8 U and 255.3 Th; 21.4 total betas/minute/g., and values of 9.63 K, 8.97 U, and 2.80 Th: 664; v. Traverse limestone, which has no carbon and almost no black shale, at depths of 2,967-ft., gave 5.2 +- 1.4 total alphas/minute/g., and values of 4.7 U and 0.5 Th; 1.15 total betas/minute/g. and values of 0.73 K, 0.36 U, and 0.06 Th: 664; Sunbury and Antrim black shales showed excellent correlation of uranium and carbon content: 664; geological discussion of the evolution of Paleozoic source beds and of black shales, the relationship of radioactivity and organic content, the role of potassium, origin of the black shale, and other related problems: 664; radioactivity determinations were made on well cuttings, which were analyzed for uranium content, carbon, hydrogen, total alpha activity, and total beta activity; in some cases the potassium content was determined by chemical analysis: 664.
Black Shales, Uranium-bearing
Gingrich No. 3 well of the Pure Oil Co. in Sec. 30, T. 18 N., R. 10 W: results of measurements on various rocks found in the well are as follows: i. Coldwater shale at depths of 2,144-2,147 ft., gave 14.7 +- 1.2 total alphas/minute/g., and values of 10.0 and 4.7 Th; 3.75 +- 0.39 total betas/minute/g., and values of 3.17 K, 0.39 U, and 0.19 Th: 664;

MICHIGAN (contd.)

Osceola County (contd.)
Uranium Occurrences
Black Shales, Uranium-bearing
Gingrich No. 3 well of the Pure Oil Co. in Sec. 30, T. 18 N., R. 10 W.: ii. Red Rock at depths of 2,147-2,162 ft., gave 13.9 +- 0.5 total alphas/minute/g., and values of 7.8 U and 4.7 Th; 1.54 +- 0.01 total betas/minute/g., and values of 1.22 K, 0.18 U, and 0.14 Th: 664; iii. Sunbury black shale, which has 95% dark gray to black shale with some pyrite and 2% carbon, at a depth of 2,163-ft., gave 52.4 +- 0.8 total alphas/minute/g., and values of 25.6 U and 26.8 Th; 8.96 +- 0.01 total betas/minute/g., and values of 6.42 K, 1.51 U, and 1.03 Th: 664; iv. Antrim black shale, which has almost 100% black shale and 5-10% carbon or several times that of the Sunbury black shale, at a depth of 2,738-2,945 ft., gave 404.1 +- 12.2 total alphas/minute/g., and values of 148.8 U and 255.3 Th; 21.4total betas/minute/g., and values of 9.63 K, 8.97 U and 2.80 Th: 664; v. Traverse limestone, which has no carbon and almost no black shale, at depths of 2,967-ft., gave 5.2 +- 1.4 total alphas/minute/g., and values of 4.7 U and 0.5 Th; 1.15 total betas/minute/g., and values of 0.73 K, 0.36 U, and 0.06 Th: 664; Sunbury and Antrim black shales showed excellent correlation of uranium and carbon content: 664;

MICHIGAN (contd.)

Osceola County (contd.)
Uranium Occurrences
Black Shales, Uranium-bearing
Gingrich No. 3 well of the Pure Oil Co. in Sec. 30, T. 18 N., R. 10 W.: geological discussion of the evolution of Paleozoic source beds and of black shales, the relationship of radioactivity and organic content, the role of potassium, origin of the black shales, and other related problems: 664; radioactivity determinations were made on well cuttings which were analyzed for uranium content, carbon, hydrogen, total alpha activity, and total beta activity; in some cases the potassium content was determined by chemical analysis: 664.

Pitchblende Occurrences
See under individual county names and under Index III, Pitchblende Occurrences-Michigan: 455, 883, 994, 995, 1047, 1050, 1051.

Prospectors' Guides
See under individual county names and under Index III, Prospectors' Guides-Michigan: 812, 892, 1091, 1101.

Radioactive Minerals
See under individual county names and under Index III, Radioactive Minerals-Michigan: 991.

Radioactive Occurrences
See under individual county names and under Index III, Radioactive Occurrences-Michigan: 805, 995.

Radioactive Rocks
See under individual county names and under Index III, Radioactive Rocks-Michigan: 722, 745, 746, 798, 829, 928, 929, 991, 992, 996, 1067, 1116.

Radioactivity Surveys (Airborne)
See under individual county names and under Index III, Radioactivity Surveys (Airborne)-Michigan: 970.
*Thorium Occurrences
Precambrian Shield: uraninite: 53.

MICHIGAN (contd.)

Rutherfordine Occurrences
See under individual county names and under Index III, Rutherfordine Occurrences-Michigan: 996.

Thorium Occurrences
See under individual county names and under Index III, Thorium Occurrences-Michigan: 53, 664, 745, 798, 841, 883, 965, 992, 994, 995, 1022, 1045, 1116.

Upper Peninsula
Black Shales, Uranium-bearing
Precambrian Nonesuch shale: samples contain as much as 0.004% uranium: 443.
Radioactive Minerals
Keweenaw Point: radioactive minerals in copper mines (See listing under Michigan-Houghton and Keweenaw Cos.-Radioactive Minerals for detailed information on individual mines): 991.
Radioactive Rocks
Keweenaw Point: radioactive rocks in copper mines (See listing under Michigan-Houghton and Keweenaw Cos.-Radioactive Rocks for detailed information on individual mines): 991.
*Uraninite Occurrences
Precambrian Shield: 53.
Uranium Occurrences
Four areas of potential uranium occurrences: areas N of Watersmeet and N of Bergland; Porcupine Mts.; Gogebic Creek; no deposits of commercial importance found there yet: 1044.
Marquette Range: Jones and Laughlin Steel Co. hopes to produce commercial uranium here since material has higher U content than any previously described in region: 1066.
Precambrian Nonesuch shale: samples contain as much as 0.004% uranium: 443.
Precambrian Shield: uraninite: 53.

(See also Keweenaw County: 991)

MICHIGAN (contd.)

Uraninite Occurrences
See under individual county names and under Index III, Uraninite Occurrences-Michigan: 53, 267, 1051.

Uranium Exploration
See under individual county names and under Index III, Uranium Exploration-Michigan: 805, 812, 892, 970, 1045, 1047, 1048, 1052, 1064, 1066, 1067, 1074, 1091, 1114.

Uranium Exploration (Airborne)
See under individual county names and under Index III, Uranium Exploration (Airborne)-Michigan: 722, 1101.

Uranium Occurrences
See under individual county names and under Index III, Uranium Occurrences-Michigan: 41, 53, 62, 267, 426, 443, 455, 632, 664, 745, 798, 840, 841, 883, 994, 995, 996, 1003, 1044, 1045, 1047, 1048, 1049, 1050, 1051, 1052, 1064, 1066, 1106, 1114, 1116.

NEW ENGLAND

General
Autunite Occurrences
Appalachian region: granites and pegmatites contain autunite, uranophane, pitchblende, uraninite: 883.
Pitchblende Occurrences
General: pitchblende in pegmatites: 13.
Appalachian region: granites and pegmatites contain autunite, uranophane, pitchblende, uraninite: 883.
Radioactive Rocks
General: radioactive rocks occur in the Hudson and Housatonic Highlands, Central New England province, and near Milton, Vermont: 842; thorium is dominant radioactive element in Central New England province, uranium at Milton, and both thorium and uranium in the Hudson and Housatonic Highlands: 842; range in intensity of radioactivity differs in provinces being 0.001-0.240% eU in the Hudson and Housatonic

NEW ENGLAND (contd.)

General
Radioactive Rocks
General:
Highlands and 0.003-0.006% eU in the Central New England Province; concentration of radioactive materials differs since most rocks in the Highlands contain 0.002% eU and few have high radioactivity while in the Central New England province most rocks range from 0.003-0.006% eU: 842; the type rock which is most radioactive differs since, in the Highlands the pegmatites tend to be highly radioactive while in the Central New England province they have about the same radioactivity as the surrounding rocks: 842; at Milton, Vermont, the black petroliferous clay galls in an intraformational breccia have up to 0.018% U; manner of occurrence of uranium and its areal distribution are indicative of syngenetic deposition; deposits as now known are too small and spotty to be of economic importance: 842.
Thorium Occurrences
General: radioactive minerals reported among the rare and accessory minerals in many pegmatites in Connecticut, Maine, and New Hampshire; geology and description of pegmatite localities: 690; pitchblende in pegmatites: 13.
Appalachian region: granites and pegmatites contain autunite, uranophane, pitchblende, uraninite: 883.
Uraninite Occurrences
Appalachian region: granites and pegmatites contain autunite, uranophane, pitchblende, uraninite: 883.

NEW ENGLAND (contd.)

General (contd.)

Uranium Occurrences

General: pitchblende in pegmatites: 13; radioactive minerals reported among the rare and accessory minerals in many pegmatites in Connecticut, Maine, and New Hampshire; geology and description of pegmatite localities: 690; pegmatite deposits contain small amounts of uranium: 824.

Appalachian region: granites and pegmatites contain autunite, uranophane, pitchblende, uraninite: 883; one of the most promising and least prospected areas in the United States since the Appalachians extend from Alabama and Georgia to Quebec and uranium minerals have been found in Alabama, Kentucky, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Tennessee, and Vermont: 1093; some of the best uranium possibilities seems to lie in the long valleys of western New Jersey and eastern Pennsylvania and in the plateaus of Alabama, northern Kentucky, and Ohio: 1093; uranium present in pegmatites and disseminated deposits in granite in the pegmatite belt that follows the trend of the Appalachian Mountains with uranium occurrences reported from New York and Vermont on the north to Georgia on the south: 1106; uranium may also be present in placer deposits in the bed of streams that drain the Appalachian Mountains: 1106.

Uranophane Occurrences

Appalachian region: granites and pegmatites contain autunite, uranophane, pitchblende, uraninite: 883.

Autunite Occurrences

See under General and individual state names and under Index III, Autunite Occurrences-New England: 883.

NEW ENGLAND (contd.)

Pitchblende Occurrences

See under General and individual state names and under Index III, Pitchblende Occurrences-New England: 13, 883.

Radioactive Rocks

See under General and individual state names and under Index III, Radioactive Rocks-New England: 842.

Thorium Occurrences

See under General and individual state names and under Index III, Thorium Occurrences-New England: 13, 690, 883.

Uraninite Occurrences

See under General and individual state names and under Index III, Uraninite Occurrences-New England: 883.

Uranium Occurrences

See under General and individual state names and under Index III, Uranium Occurrences-New England: 13, 690, 824, 883, 1093, 1106.

Uranophane Occurrences

See under General and individual state names and under Index III, Uranophane Occurrences-New England: 883.

(See also: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont)

NEW HAMPSHIRE

General
Allanite Occurrences
Highlandcroft (Paleozoic) magma series: analyses of 10 rocks showed a range in eU of 10- 30 ppm.; age determinations; mineral separations from rocks in New Hampshire, Oliverian, and Highlandcroft magma series, showed radioactivity is concentrated in zircon, monazite, allanite, xenotime, and sphene, and in aplites and pegmatites; zircons have unusually high alpha counts and are associated locally with uraninite: 996.
New Hampshire (Paleozoic) magma series: allanite exceedingly rare in this series but small amounts of monazite occur in Bethlehem gneiss of Moosilauke quadrangle: 674; analyses of 65 rocks showed a range of eU from 20-60 ppm; age determinations; mineral separations from rocks of New Hampshire, Oliverian, and Highlandcroft magma series, showed radioactivity is concentrated in zircon, monazite, allanite, xenotime, and sphene, and in aplites and pegmatites; zircons have unusually high alpha counts and are associated locally with uraninite: 996.
Oliverian (Paleozoic) magma series: allanite occurs in traces in quartz diorite, granodiorite, quartz monzonite, hornblende-quartz monzonite, and syenite: 674; analyses of 67 rocks showed a range in eU of 10-60 ppm.; age determinations; mineral separations from rocks of New Hampshire, Oliverian, and Highlandcroft magma series, showed radioactivity is concentrated in zircon, monazite, allanite, xenotime, and sphene, and, in aplites and pegmatites; zircons have unusually high alpha counts and are associated locally with uraninite: 996.
White Mountain granites: radioactivity due largely to presence of allanite and zircon with the highest uranium content in the youngest phase of the

NEW HAMPSHIRE (contd.)

General (contd.)
Allanite Occurrences
White Mountain granites: magmatic series, the Conway biotite granite: 1103.
White Mountain (Paleozoic) magma series: allanite as a minor accessory: 859; allanite as an accessory mineral: 699; allanite occurs in traces in syenite, quartz syenite (Albany type), riebeckite granite, and biotite granite: 674.
Monazite Occurrences
General: monazite in granites and gneisses: 104.
Highlandcroft (Paleozoic) magma series: analyses of 10 rocks showed a range in eU of 10-30 ppm.; age determinations; mineral separations from rocks in New Hampshire, Oliverian, and Highlandcroft magma series, showed radioactivity is concentrated in zircon, monazite, allanite, xenotime, and sphene, and in aplites and pegmatites; zircons have unusually high alpha counts and are associated locally with uraninite: 996.
New Hampshire (Paleozoic) magma series: allanite exceedingly rare in this series but small amounts of monazite occur in Bethlehem gneiss of Moosilauke quadrangle: 674; analyses of 65 rocks showed a range of eU from 20-60 ppm; age determinations; mineral separations from rocks of New Hampshire, Oliverian, and Highlandcroft magma series, showed radioactivity is concentrated in zircon, monazite, allanite, xenotime, and sphene, and in aplites and pegmatites; zircons have unusually high alpha counts and are associated locally with uraninite: 996.

NEW HAMPSHIRE (contd.)

General (contd.)
Monazite Occurrences
Oliverian (Paleozoic) magma series: analyses of 67 rocks showed a range in eU of 10-60 ppm; age determinations; mineral separations from rocks of New Hampshire, Oliverian, and Highlandcroft magma series, showed radioactivity is concentrated in zircon, monazite, allanite, xenotime, and sphene, and in aplites and pegmatites, zircons have unusually high alpha counts and are associated locally with uraninite: 996.
Prospectors' Guides
Exploration methods: 1101.
Mining laws: 1101.
Uranium: 1101.
Radioactive Rocks
General: granites with higher radioactivity than the parent rock, such as are found at the Great Bear Lake, Canada, uranium deposits, occur over wide areas; since the magmas from which they came might produce radioactive ore solutions under appropriate conditions, such areas should be examined by radioactive geophysical methods and searched for favorable structure conditions and suitable host rocks: 45.
Highlandcroft (Paleozoic) magma series: analyses of 10 rocks showed a range of eU of 10-30 ppm.; age determinations; mineral separations from rocks of New Hampshire, Oliverian, and Highlandcroft magma series, showed radioactivity is concentrated in zircon, monazite, allanite, xenotime, and sphene, and in aplites and pegmatites; zircons have unusually high alpha counts and are associated locally with uraninite: 996.
Highlandcroft (Paleozoic) magma series
Radioactivity of the series
General: radioactivity showed an increase from diorite to granodiorite but specimens of quartz

NEW HAMPSHIRE (contd.)

General (contd.)
Radioactive Rocks
Highlandcroft (Paleozoic) magma series
Radioactivity of the series
General:
monzonite and granite were not available for study: 674.
Types:
1. Diorite: radioactivity, 0.59 alpha /mg./hr.;
2. Quartz diorite: radioactivity, 0.58 alpha /mg./hr.;
3. Granodiorite: radioactivity of 2 samples ranged from 1.21-1.68, with an average of 1.44 + - 0.16, alpha /mg./hr.: 674.
New Hampshire (Paleozoic) magma series: analyses of 65 rocks showed a range in eU from 20-60 ppm.; age determinations; mineral separations from rocks of New Hampshire, Oliverian, and Highlandcroft magma series, showed radioactivity is concentrated in zircon, monazite, allanite, xenotime, and sphene, and, in aplites and pegmatites; zircons have unusually high alpha counts and are associated locally with uraninite: 996.
Radioactivity of the Series
General: radioactivity increases from diorite-amphibolite to granite end of series but these granites are less radioactive than those of White Mountain magma series; data on percentages of accessory minerals in these granites are insufficient to justify any attempt to explain why the granites are several times more radioactive than the diorite and amphibolite: 674.

NEW HAMPSHIRE (contd.)

General (contd.)
Radioactive Rocks
New Hampshire (Paleozoic) Magma Series
Types
1. Amphibolite: radioactivity of 2 samples ranged from 0.33-0.85, with an average of 0.59 ± - 0.17, alpha /mg./hr.;
2. Moulton diorite: radioactivity of 3 samples ranged from 0.31-1.73, with an average of 0.90 ± - 0.35, alpha /mg./hr.;
3. Remick quartz diorite: radioactivity, 0.72 alpha /mg./hr.;
4. Winnipesaukee quartz diorite: radioactivity of 2 samples ranged from 0.15-0.85, with an average of 0.50 ± -0.23, alpha / mg./hr.;
5. Bethlehem gneiss (Quartz monzonite): radioactivity of 9 samples ranged from 0.94-2.67, with an average of 1.94 ± - 0.13, alpha /mg./hr.;
6. Kinsman quartz monzonite: radioactivity of 7 samples ranged from 0.99-2.31, with an average of 1.71 ± - 0.14, alpha /mg./hr.;
7. Meredith granite: radioactivity 1.46 alpha /mg./hr.;
8. Long Mountain granite: radioactivity of 2 samples ranged from 2.30-3.19, with an average of 2.74 ± - 0.29, alpha /mg./hr.;
9. Concord, Bickford, and related granites: radioactivity of 15 samples ranged from 1.29-4.55, with an average of 2.60 ± - 0.13, alpha /mg./hr.;
10. Chatham group: radioactivity of 4 samples ranged from 0.80-1.56, with an average of 1.12 ± - 0.11, alpha /mg./hr.: 674.

Combinations of Some of These Types
1. Quartz diorite: radioactivity of 3 samples ranged from 0.15-0.85, with an average of 0.57 ± - 0.15, alpha /mg./hr.;
2. Quartz monzonite: radioactivity of 16 samples ranged from 0.94-2.67, with an average of 1.84 ± - 0.09, alpha /mg./hr.;

NEW HAMPSHIRE (contd.)

General (contd.)
Radioactive Rocks
New Hampshire (Paleozoic) Magma Series
Combinations of Some of These Types
3. Granite: radioactivity of 18 samples ranged from 1.29-4.55, with an average of 2.55 ± - 0.12, alpha/ mg./hr.: 674.

Oliverian (Paleozoic) magma series: analyses of 67 rocks showed a range of eU of 10-60 ppm.; age determinations; mineral separations from rocks of New Hampshire, Oliverian, and Highlandcroft magma series, showed radioactivity is concentrated in zircon, monazite, allanite, xenotime, and sphene, and, in aplites and pegmatites; zircons have unusually high alpha counts and are associated locally with uraninite: 996.

Radioactivity of series
General: radioactivity increases from the quartz diorite to the granite end of the series; data on percentages of accessory minerals in these granites are insufficient to justify any attempt to explain why the granites are 2½ times as radioactive as the quartz diorite: 674.

Types
1. Quartz diorite: radioactivity of 4 samples ranged from 0.61-1.60, with an average of 1.04 ± - 0.15, alpha /mg./hr.;
2. Granodiorite: radioactivity of 6 samples ranged from 0.59-3.07, with an average of 1.35 ± - 0.25, alpha /mg./hr.;
3. Quartz monzonite: radioactivity of 4 samples ranged from 2.59-3.00, with an average of 2.76

NEW HAMPSHIRE (contd.)

General (contd.)
Radioactive Rocks
Oliverian (Paleozoic) Magma Series
Types
3. Quartz monzonite: ± - 0.07, alpha /mg/hr.;
4. Granite: radioactivity of 11 samples ranged from 1.29-4.49, with an average of 2.67 ± - 0.18, alpha /mg./hr.;
5. Syenite: radioactivity, 1.77 alpha /mg./hr.;
6. Hornblende-quartz monzonite: radioactivity of 2 samples ranged from 1.29-2.44, with an average of 1.86 ± - 0.39, alpha /mg./hr.: 674.

Combinations of Some of These types
1. Quartz monzonite: radioactivity of 6 samples ranged from 1.29-3.00, with an average of 2.46 ± - 0.52, alpha /mg./hr.: 674.

Paleozoic Magma Series
Radioactivity
General: radioactivity increases from the gabbrodiorite end to the granitic end in all four magma series, with the increase being 4.15 times in White Mountain magma series, 4.24 times in New Hampshire magma series, and 2.57 times in Oliverian magma series while data are too incomplete to give a figure for Highlandcroft magma series: 674.

Radioactivity of Granitic Rocks
General: greater radioactivity of granitic end of all four magma series may be due to increase in radioactive elements in minerals of granitic end because of the relatively higher concentration of radioactive elements in the later magma; only in the White Mountain magma series data are sufficient to show an increase in the quantity of radioactive accessory minerals like allanite and zircon, toward the granitic end of the magma series: 674.

NEW HAMPSHIRE (contd.)

General (contd.)
Radioactive Rocks
Paleozoic Magma Series
Radioactivity of Rocks Types regardless of Magma Series
Average amounts of uranium and thorium in the twelve rock types (exclusive of the dike rocks): average calculated content in weight percent is 0.00038 U, with the lowest U value 0.00002 and the highest 0.00134, and the average for Th is 0.00124 Th, with the lowest Th value 0.00008 and the highest 0.00442: 674.

Amphibolite: radioactivity of 2 samples ranged from 0.33-0.85, with an average of 0.59 ± - 0.17, alpha /mg./hr. and an average calculated content in weight percent of 0.00009 U and 0.00030 Th: 674.

Dike rocks
1. Bostonite: radioactivity, 1.75 alpha /mg./hr.;
2. Paisanite: radioactivity, 5.61 alpha /mg./hr.;
3. Aplite: radioactivity, 2.56 alpha /mg./hr.;
4. Nepheline syenite: radioactivity, 0.99 alpha /mg./hr.: 674

Diorite: radioactivity of 6 samples ranged from 0.31-1.73, with an average of 0.98 ± - 0.15, alpha /mg./hr. and an average calculated content in weight percent of 0.00015 U and 0.00050 Th: 674.

Gabbro: radioactivity of 3 samples ranged from 0.70-1.82, with an average of 1.28 ± - 0.22, alpha /mg./hr. and an average calculated content in weight percent of 0.00020 U and 0.00065 Th: 674.

NEW HAMPSHIRE (contd.)

General (contd.)
Radioactive Rocks
Paleozoic Magma Series
Radioactivity of Rocks Types regardless of Magma Series
Granite: radioactivity of 55 samples ranged from 1.29-8.69, with an average of 3.36 ± -0.12, alpha /mg./hr. and an average calculated content in weight percent of 0.00052 U and 0.00170 Th.: 674.
Granodiorite: radioactivity of 8 samples ranged from 0.59-3.07, with an average of 1.37 ± -0.19, alpha /mg./hr. and an average calculated content in weight percent of 0.00021 U and 0.00070 Th.: 674.
Monzodiorite: radioactivity of 3 samples ranged from 1.05-4.01, with an average of 2.14 ± -0.63, alpha /mg./hr. and an average calculated content in weight percent of 0.00033 U and 0.00109 Th.: 674.
Nepheline-sodalite-syenite: radioactivity, 1.17 alpha /mg./hr. and an average calculated content in weight percent of 0.00018 U and 0.00059 Th.: 674.
Norite (hypersthene diorite): radioactivity, 0.56 alpha /mg./hr. with an average calculated content in weight percent of 0.00009 U and 0.00028 Th.:674.
Quartz diorite: radioactivity of 8 samples ranged from 0.15-1.60, with an average of 0.81 ± -0.10, alpha /mg./hr. and an average calculated content in weight percent of 0.00012 U and 0.00041 Th.:674.
Quartz monzonite: radioactivity of 22 samples ranged from 0.94-3.00, with an average of 2.01 ± -0.08, alpha /mg./hr. and an average calculated content of 0.00031 U and 0.00102 Th.: 674.

NEW HAMPSHIRE (contd.)

General (contd.)
Radioactive Rocks
Paleozoic Magma Series
Radioactivity of Rock Types regardless of Magma Series
Quartz syenite: radioactivity of 9 samples ranged from 1.60-5.12, with an average of 3.09 ± - 0.80, alpha /mg./hr. and an average calculated content in weight percent of 0.00048 U and 0.00157 Th.: 674.
Syenite: radioactivity of 9 samples ranged from 0.79-5.03, with an average of 2.22 ± - 0.32, alpha /mg./hr. and an average calculated content in weight percent of 0.00034 U and 0.00113 Th: 674.
White Mountain granites: radioactivity due largely to presence of allanite and zircon with the highest uranium content in the youngest phase of the magmatic series, the Conway biotite granite: 1103.
White Mountain (Paleozoic) Magma Series
Radioactivity of the series
General: radioactivity increases from gabbro to granite end of series; increase in radioactivity in granitic end due primarily to appearance of allanite and secondarily to increase in amount of zircon: 674
Dike Rocks
Bostonite: radioactivity, 1.75 alpha /mg./hr.: 674.
Paisanite: radioactivity, 5.61 alpha /mg./hr.: 674.
Aplite: radioactivity, 2.56 alpha /mg./hr.: 674.
Nepheline syenite: radioactivity, 0.99 alpha /mg./hr.: 674.

NEW HAMPSHIRE (contd.)

General (contd.)
Radioactive Rocks
White Mountain (Paleozoic) Magma Series
Types

1. Gabbro: radioactivity of 3 samples ranged from 0.70-1.82, with an average of 1.28 ± 0.22, alphas/mg./hr.: 674.
2. Norite (hypersthene diorite): radioactivity, 0.56 alphas/mg./hr.; 674.
3. Diorite: radioactivity of 2 samples ranged from 1.18-1.14 (sic, 1.44?), with an average of 1.31 ± 0.09, alphas/mg./hr.: 674.
4. Monzodiorite: radioactivity of 3 samples ranged from 1.05-4.01, with an average of 2.14 ± 0.63, alphas/mg./hr.; 674.
5. Syenite: radioactivity of 8 samples ranged from 0.79-5.03, with an average of 2.29 ± 0.34, alphas/mg./hr.: 674.
6. Nepheline-sodalite syenite: radioactivity, 1.17 alphas/mg./hr.; 674.
7. Quartz syenite: radioactivity of 4 samples ranged from 1.60-3.36, with an average of 2.46 ± 0.29, alphas/mg./hr.: 674.
8. Quartz syenite (Albany type): radioactivity of 5 samples ranged from 2.69-5.12, with an average of 3.49 ± 0.31, alphas/mg./hr.: 674.
9. Hastingsite-biotite granite: radioactivity, 4.49 alphas/mg./hr.: 674.
10. Hastingsite granite and soda-hornblende granite (Mt. Osceola type): radioactivity of 3 samples ranged from 2.12-4.17, with an average of 3.24 ± 0.40, alphas/mg./hr.: 674.
11. Riebeckite granite: radioactivity of 2 samples ranged from 2.34-3.01 with an average of 2.67 ± 0.22, alphas/mg./hr.: 674.

NEW HAMPSHIRE (contd.)

General (contd.)
Radioactive Rocks
White Mountain (Paleozoic) Magma Series
Types

12. Granite porphyry (Mt. Lafayette type): radioactivity of 3 samples ranged from 4.15-5.04, with an average of 4.55 ± 0.06, alphas/mg./hr.: 674.
13. Biotite granite (Conway type): radioactivity of 16 samples ranged from 1.59-8.69, with an average of 4.56 ± 0.29, alphas/mg./hr.: 674.

Combinations of Some of These Types

1. Gabbro and norite: radioactivity of 4 samples ranged from 0.56-1.82, with an average of 1.10 ± 0.19, alphas/mg./hr.: 674.
2. Syenite (Including nepheline-sodalite syenite): radioactivity of 9 samples ranged from 0.79-5.03, with an average of 2.16 ± 0.31, alphas/mg./hr.: 674.
3. Quartz syenite: radioactivity of 9 samples ranged from 1.60-5.12, with an average of 3.09 ± 0.80, alphas/mg./hr.: 674.
4. Amphibole granite: radioactivity of 6 samples ranged from 2.12-4.49, with an average of 3.26 ± 0.28, alphas/mg/hr.: 674.

NEW HAMPSHIRE (contd.)

General (contd.)
Thorium Occurrences
General: monazite in granites and gneisses: 104.
Highlandcroft (Paleozoic) magma series: analyses of 10 rocks showed a range in eU of 10-30 ppm.; age determinations; mineral separations from rocks of New Hampshire, Oliverian, and Highlandcroft magma series, showed radioactivity is concentrated in zircon, monazite, allanite, xenotime, and sphene, and, in aplites and pegmatites; zircons have unusually high alpha counts and are associated locally with uraninite: 996.
New Hampshire (Paleozoic) magma series: allanite exceedingly rare in this series but small amounts of monazite occur in Bethlehem gneiss of Moosilauke quadrangle: 674; analyses of 65 rocks showed a range in eU from 20-60 ppm.; age determinations; mineral separations from rocks of New Hampshire, Oliverian, and Highlandcroft magma series, showed radioactivity is concentrated in zircon, monazite, allanite, xenotime, and sphene, and, in aplites and pegmatites; zircons have unusually high alpha counts and are associated locally with uraninite: 996.
Oliverian (Paleozoic) magma series: allanite occurs in traces in quartz diorite, granodiorite, quartz monzonite, hornblende-quartz monzonite, and syenite: 674; analyses of 67 rocks showed a range in eU of 10-60 ppm.; age determinations; mineral separations from rocks of New Hampshire, Oliverian, and Highlandcroft magma series, showed radioactivity is concentrated in zircon, monazite, allanite, xenotime, and sphene, and, in aplites and pegmatites; zircons have unusually high alpha counts and are associated locally with uraninite: 996.

NEW HAMPSHIRE (contd.)

General (contd.)
Thorium Occurrences
Paleozoic Magma Series
Average amounts of uranium and thorium in the twelve rock types (exclusive of the dike rocks): average calculated content in weight percent is 0.00038 U, with the lowest U value 0.00002 and the highest 0.00134, and the average for Th is 0.00124 Th, with the lowest Th value 0.00008 and the highest 0.00442: 674.
Amphibolite: radioactivity of 2 samples ranged from 0.33-0.85, with an average of 0.59 ± -0.17, alpha /mg./hr. and an average calculated content in weight percent of 0.00009 U and 0.00030 Th.: 674.
Diorite: radioactivity of 6 samples ranged from 0.31-1.73 with an average of 0.98 ± -0.15, alpha /mg./hr. and an average calculated content in weight percent of 0.00015 U and 0.00050 Th.: 674.
Gabbro: radioactivity of 3 samples ranged from 0.70-1.82, with an average of 1.28 ± -0.22, alpha /mg./hr. and an average calculated content in weight percent of 0.00020 U and 0.00065 Th.: 674.
Granite: radioactivity of 55 samples ranged from 1.29-8.69, with an average of 3.36 ± -0.12, alpha /mg./hr. and an average calculated content in weight percent of 0.00052 U and 0.00170 Th.: 674.
Granodiorite: radioactivity of 8 samples ranged from 0.59-3.07, with an average of 1.37 ± - 0.19, alpha /mg./hr. and an average calculated content in weight percent of 0.00021 U and 0.00070 Th.: 674.

NEW HAMPSHIRE (contd.)

General (contd.)
Thorium Occurrences
Paleozoic Magma Series
Monzodiorite: radioactivity of 3 samples ranged from 1.05-4.01, with an average of 2.14 ± 0.63, alphas/mg./hr. and an average calculated content in weight percent of 0.00033 U and 0.00109 Th.: 674.
Nepheline-sodalite-syenite: radioactivity, 1.17 alphas/mg./hr. and an average calculated content in weight percent of 0.00018 U and 0.00059 Th.: 674.
Norite (hypersthene diorite): radioactivity, 0.56 alphas/mg./hr. with an average calculated content in weight percent of 0.00009 U and 0.00028 Th.: 674.
Quartz diorite: radioactivity of 8 samples ranged from 0.15-1.60, with an average of 0.81 ± 0.10, alphas/mg./hr. and an average calculated content in weight percent of 0.00012 U and 0.00041 Th.: 674.
Quartz monzonite: radioactivity of 22 samples ranged from 0.94-3.00, with an average of 2.01 ± 0.08, alphas/mg./hr. and an average calculated content of 0.00031 U and 0.00102 Th.: 674.
Quartz syenite: radioactivity of 9 samples ranged from 1.60-5.12, with an average of 3.09 ± 0.80, alphas/mg./hr. and an average calculated content in weight percent of 0.00048 U and 0.00157 Th.: 674.
Syenite: radioactivity of 9 samples ranged from 0.79-5.03, with an average of 2.22 ± 0.32, alphas/mg./hr. and an average calculated content in weight percent of 0.00034 U and 0.00113 Th.: 674.
White Mountain granites: radioactivity due largely to presence of allanite and zircon with the highest uranium content in the youngest phase of the magmatic series, the Conway biotite granite: 1003.

NEW HAMPSHIRE (CONTD.)

General (contd.)
Thorium Occurrences
White Mountain (Paleozoic) magma series: allanite as a minor accessory: 859; allanite as an accessory mineral: 699, allanite occurs in traces in syenite, quartz syenite (Albany type), riebeckite granite, and biotite granite: 674.
Uraninite Occurrences
Highlandcroft (Paleozoic) magma series: analyses of 10 rocks showed a range in eU of 10-30 ppm; age determinations; mineral separations from rocks in New Hampshire, Oliverian, and Highlandcroft magma series, showed radioactivity is concentrated in zircon, monazite, allanite, xenotime, and sphene, and in aplites and pegmatites; zircons have unusually high alpha counts and are associated locally with uraninite: 996.
New Hampshire (Paleozoic) magma series: analyses of 65 rocks showed a range of eU from 20-60 ppm.; age determinations; mineral separations from rocks of New Hampshire, Oliverian, and Highlandcroft magma series, showed radioactivity is concentrated in zircon, monazite, allanite, xenotime and sphene, and in aplites and pegmatites; zircons have unusually high alpha counts and are associated locally with uraninite: 996.
Oliverian (Paleozoic) magma series: analyses of 67 rocks showed a range in eU of 10-60 ppm.; age determinations; mineral separations from rocks of New Hampshire, Oliverian, and Highlandcroft magma series, showed radioactivity is concentrated in zircon, monazite, allanite, xenotime, and sphene, and in aplites and pegmatites; zircons have unusually high alpha counts and are associated locally with uraninite: 996.

NEW HAMPSHIRE (contd.)

General (contd.)
Uranium Exploration
Methods: 1101.
Mining laws: 1101.
Prospectors' guides: 1101.
Uranium Occurrences
Appalachian region: one of the most promising and least prospected areas in the United States since the Appalachians extend from Alabama and Georgia to Quebec and uranium minerals have been found in Alabama, Kentucky, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Tennessee, and Vermont: 1093.
Bibliography of U.S.G.S. Reports: 572, 1004.
Highlandcroft (Paleozoic) magma series: analyses of 10 rocks showed a range in eU of 10-30 ppm.; age determinations; mineral separations from rocks of New Hampshire, Oliverian, and Highlandcroft magma series, showed radioactivity is concentrated in zircon, monazite, allanite, xenotime, and sphene, and, in aplites and pegmatites; zircons have unusually high alpha counts and are associated locally with uraninite: 996.
New Hampshire (Paleozoic) magma series: analyses of 65 rocks showed a range in eU from 20-60 ppm.; age determinations; mineral separations from rocks of New Hampshire, Oliverian, and Highlandcroft magma series, showed radioactivity is concentrated in zircon, monazite, allanite, xenotime, and sphene, and, in aplites and pegmatites; zircons have unusually high alpha counts and are associated locally with uraninite: 996.
Oliverian (Paleozoic) magma series: analyses of 67 rocks showed a range in eU of 10-60 ppm.; age determinations; mineral separations from rocks of New Hampshire, Oliverian, and Highlandcroft magma series, showed radioactivity is concentrated in zircon, monazite, allanite, xenotime,

NEW HAMPSHIRE (contd.)

General (contd.)
Uranium Occurrences
Oliverian (Paleozoic) magma series:
and sphene, and, in aplites and pegmatites; zircons have unusually high alpha counts and are associated locally with uraninite: 996.
Paleozoic Magma Series
Average amounts of uranium and thorium in the twelve rock types (exclusive of the dike rocks): average calculated content in weight percent is 0.00038 U, with the lowest U value 0.00002 and the highest 0.00134, and the average for Th is 0.00124 Th, with the lowest Th value 0.00008 and the highest 0.00442: 674.
Amphibolite: radioactivity of 2 samples ranged from 0.33-0.85, with an average of 0.59 ± 0.17, alphas/mg./hr. and an average calculated content in weight percent of 0.00009 U and 0.00030 Th.: 674.
Diorite: radioactivity of 6 samples ranged from 0.31-1.73 with an average of 0.98 ± 0.15, alphas/mg./hr. and an average calculated content in weight percent of 0.00015 U and 0.00050 Th.: 674.
Gabbro: radioactivity of 3 samples ranged from 0.70-1.82, with an average of 1.28 ± 0.22, alphas/mg./hr. and an average calculated content in weight percent of 0.00020 U and 0.00065 Th.: 674.
Granite: radioactivity of 55 samples ranged from 1.29-8.69, with an average of 3.36 ± 0.12, alphas/mg./hr. and an average calculated content in weight percent of 0.00052 U and 0.00170 Th.: 674.

NEW HAMPSHIRE (contd.)

General (contd.)
Uranium Occurrences
Paleozoic Magma Series
Granodiorite: radioactivity of 8 samples ranged from 0.59-3.07, with an average of 1.37 ± 0.19, alpha/mg./hr. and an average calculated content in weight percent of 0.00021 U and 0.00070 Th.: 674.
Monzodiorite: radioactivity of 3 samples ranged from 1.05-4.01, with an average of 2.14 ± 0.63, alpha/mg./hr. and an average calculated content in weight percent of 0.00033 U and 0.00109 Th.: 674.
Nepheline-sodalite-syenite: radioactivity, 1.17 alpha/mg./hr. and an average calculated content in weight percent of 0.00018 U and 0.00059 Th.: 674.
Norite (hypersthene diorite): radioactivity, 0.56 alpha/mg/hr. with an average calculated content in weight percent of 0.00009 U and 0.00028 Th.: 674.
Quartz diorite: radioactivity of 8 samples ranged from 0.15-1.60, with an average of 0.81 ± 0.10, alpha/mg./hr. and an average calculated content in weight percent of 0.00012 U and 0.00041 Th.: 674.
Quartz monzonite: radioactivity of 22 samples ranged from 0.94-3.00, with an average of 2.01 ± 0.08, alpha/mg./hr. and an average calculated content of 0.00031 U and 0.00102 Th.: 674.
Quartz syenite: radioactivity of 9 samples ranged from 1.60-5.12, with an average of 3.09 ± 0.80, alpha/mg./hr. and an average calculated content in weight percent of 0.00048 U and 0.00157 Th.: 674.
Syenite: radioactivity of 9 samples ranged from 0.79-5.03, with an average of 2.22 ± 0.32, alpha/mg./hr. and an average calculated content in weight percent of 0.00034 U and 0.00113 Th.: 674.

NEW HAMPSHIRE (contd.)

General (contd.)
Uranium Occurrences
White Mountain granites: radioactivity due largely to presence of allanite and zircon with the highest uranium content in the youngest phase of the magmatic series, the Conway biotite granite: 1103.
Xenotime Occurrences
Highlandcroft (Paleozoic) magma series: analyses of 10 rocks showed a range in eU of 10-30 ppm.; age determinations; mineral separations from rocks of New Hampshire, Oliverian, and Highlandcroft magma series, showed radioactivity is concentrated in zircon, monazite, allanite, xenotime, and sphene, and, in aplites and pegmatites; zircons have unusually high alpha counts and are associated locally with uraninite: 996.
New Hampshire (Paleozoic) magma series: analyses of 65 rocks showed a range in eU from 20-60 ppm.; age determinations; mineral separations from rocks of New Hampshire, Oliverian, and Highlandcroft magma series, showed radioactivity is concentrated in zircon, monazite, allanite, xenotime, and sphene, and, in aplites and pegmatites; zircons have unusually high alpha counts and are associated locally with uraninite: 996.
Oliverian (Paleozoic) magma series: analyses of 67 rocks showed a range in eU of 10-60 ppm.; age determinations; mineral separations from rocks of New Hampshire, Oliverian, and Highlandcroft magma series, showed radioactivity is concentrated in zircon, monazite, allanite, xenotime, and sphene, and, in aplites and pegmatites; zircons have unusually high alpha counts and are associated locally with uraninite: 996.

NEW HAMPSHIRE (contd.)

Age Determinations
See under individual county names and under Index III, Age Determinations-New Hampshire: 1040.

Allanite Occurrences
See under individual county names and under Index III, Thorium Occurrences-New Hampshire: 673, 674, 695, 696, 697, 699, 715, 716, 727, 859, 860, 996, 1103.

Autunite Occurrences
See under individual county names and under Index III, Autunite Occurrences-New Hampshire: 646, 647, 650, 651, 658, 690, 757, 774, 835, 856, 857, 859, 958, 963, 974, 978, 999, 1000, 1001, 1053, 1061, 1079.

Belknap County
Allanite Occurrences
Belknap Mountains: allanite as an accessory mineral in porphyritic rhyolite of White Mountain magma series: 699.
Radioactive Rocks
Central New England Province
New Hampshire Highway 11A for 3 mi. between West Alton and Gilford starting 3 mi. W of junction with New Hampshire 11: radioactivity of granite in Conway granite area, 0.003-0.005% eU: 842.
Thorium Occurrences
Belknap Mountains: allanite as an accessory mineral in porphyritic rhyolite of White Mountain magma series: 699.

Bibliographies
Uranium Occurrences
Bibliography of U.S.G.S. Reports: 572, 1004.

NEW HAMPSHIRE (contd.)

Carroll County
Allanite Occurrences
North Conway quadrangle
White Mountains Alkaline Batholith
General: granitic dikes, cutting other formations at various locations in batholith, often contain allanite as a minor accessory mineral; geology; petrology; structure: 673.
Albany: allanite as a minor accessory mineral in porphyritic nordmarkite, also called Albany granite by Hitchcock: 673.
Baldface Mountain: allanite as an accessory mineral in the Red phase of the Conway biotite granite: 673.
Chandler Mountain: allanite as a minor accessory mineral in the nordmarkite of the Chocorua Group: 673.
Fletcher and Lahey quarry at Conway in Madison; $2\frac{1}{2}$ mi. SW of Conway Corners: allanite as an accessory mineral in pinkish gray biotite granite: 715, 716.
Goodrich Falls: allanite as an accessory mineral in the Red phase of the Conway biotite granite: 673.
Hurricane gold mine, Hurricane Mountain: allanite as an accessory mineral in the Red phase of the Conway biotite granite: 673.
Jackson Falls: allanite as a minor accessory mineral in porphyritic nordmarkite, also called Albany granite by Hitchcock: 673.
Moat Mountain, E slope: allanite as an accessory mineral in the Red phase of the Conway biotite granite: 673.

NEW HAMPSHIRE (contd.)

Carroll County (contd.)
Allanite Occurrences
North Conway quadrangle
White Mountain Alkaline Batholith
Mount Stanton: allanite as an accessory mineral in the Red phase of the Conway biotite granite: 673.
Mountain Pond, hills around: allanite as a minor accessory mineral in the nordmarkite of the Chocorua Group: 673.
North Conway: allanite as a minor accessory in the White Mountain magma series: 859.
Peaked Mountain: allanite as an accessory mineral in the Red phase of the Conway biotite granite: 673.
Redstone granite quarries, Redstone: allanite as an accessory mineral in the Red phase of the Conway biotite granite: 673.
Redstone green quarry at Conway on Redstone Ledge, operated by the Maine and New Hampshire Granite Corp.: allanite as an accessory mineral in olive green granite, of which the limonite stain comes from alteration of somewhat abundant particles and crystals of allanite: 715;
allanite, mostly in biotite, as an accessory mineral in "Redstone green granite": 716;
Redstone Ledge: allanite as an accessory mineral in the Red phase of the Conway biotite granite: 673.
Robbins Ridge region: allanite as a minor accessory in the hastingsite granite of the Chocorua Group: granite is finer-textured than usual and occurs in an area primarily of biotite granite: 673.
Sable Mountain: allanite as a minor accessory mineral in the nordmarkite of the Chocorua Group: 673.

NEW HAMPSHIRE (contd.)

Carroll County (contd.)
Allanite Occurrences
North Conway quadrangle
White Mountain Alkaline Batholith
South Doublehead Mountain area: allanite as a minor accessory in the hastingsite granite of the Chocorua Group: 673.
Thompson's Falls on Moat Brook: allanite as an accessory mineral in the Red phase of the Conway biotite granite: 673.
Weeks Brook: allanite as an accessory mineral in the Red phase of the Conway biotite granite; Red phase shatters diorite here: 673.
White Mountain quarry, owned by H.A. Hitner's Sons Co., Philadelphia, at Conway 1 3/4 mi. S of North Conway, on W side of hill between Saco River and Moat Brook, SE of White Horse Ledge: allanite as an accessory mineral in medium pinkish buff gray biotite granite: 715.
White Mountain quarry in Conway: allanite as an accessory mineral in granite: 716.
Ossipee Mountains: allanite as an accessory mineral in porphyritic rhyolite of White Mountain magma series: 699; allanite as a minor accessory in the White Mountain magma series: 859.
Percy quadrangle: allanite as a minor accessory in White Mountain magma series: 859.
Province Lake mine in Wakefield, 1 mi. WNW of Province Lake village: allanite associated with quartz, feldspar, columbite, beryl, etc.: 860.

NEW HAMPSHIRE (contd.)

Carroll County (contd.)
Columbite, Uranium-bearing
Wakefield, Feldspar deposit at: columbite in large black lustrous masses with small bright yellow patches scattered over the surface; chemical analysis of columbite showed 0.48% uranium: 895.
Monazite Occurrences
East Pond, Wakefield: monazite in gneiss: 726.
Radioactive Rocks
Central New England Province
Kearsarge, 2 mi. E of post office on unnumbered road to Kimbal Pond: radiometric and chemical analyses of Conway biotite granite sample, 0.005% eU and 0.001% U: 842.
Redstone, 1 mi. NE of, in granite quarry: radiometric and chemical analyses of Conway biotite granite sample, 0.006% eU, 0.001% U, and 0.002, 0.003, and 0.006% ThO_2: 842.
Samarskite Occurrences
Wakefield
Weeks mine: samarskite and chrysoberyl in pegmatite: 886.
Weeks quarry SW of Province Lake: beryl, samarskite intergrown with columbite in masses weighing up to 60 lbs. in albite, among rare and accessory minerals in pegmatite; geology, description: 690.
Thorium Occurrences
Central New England Province
Redstone, 1 mi. NE of, in granite quarry: radiometric and chemical analyses of Conway biotite granite sample, 0.006% eU, 0.001% U, and 0.002, 0.003, and 0.006% ThO_2: 842.
North Conway quadrangle
White Mountains Alkaline Batholith
General: granitic dikes, cutting other formations at various locations in batholith, often contain allanite as a minor accessory mineral; geology; petrology; structure: 673.

NEW HAMPSHIRE (contd.)

Carroll County (contd.)
Thorium Occurrences
North Conway quadrangle
White Mountains Alkaline Batholith
Albany: allanite as a minor accessory mineral in porphyritic nordmarkite, also called Albany granite by Hitchcock: 673.
Baldface Mountain: allanite as an accessory mineral in the Red phase of the Conway biotite granite: 673.
Chandler Mountain: allanite as a minor accessory mineral in the nordmarkite of the Chocorua Group: 673.
Fletcher and Lahey quarry at Conway in Madison, 2½ mi. SW of Conway Corners: allanite as an accessory mineral in pinkish gray biotite granite: 715.
Fletcher quarry in Madison: allanite as an accessory mineral in granite: 716.
Goodrich Falls: allanite as an accessory mineral in the Red phase of the Conway biotite granite: 673.
Hurricane gold mine, Hurricane Mountain: allanite as an accessory mineral in the Red phase of the Conway biotite granite: 673.
Jackson Falls: allanite as a minor accessory mineral in porphyritic nordmarkite, also called Albany granite by Hitchcock: 673.
Moat Mountain, E slope: allanite as an accessory mineral in the Red phase of the Conway biotite granite: 673.
Mount Stanton: allanite as an accessory mineral in the Red phase of the Conway biotite granite: 673.

NEW HAMPSHIRE (contd.)

Carroll County (contd.)
Thorium Occurrences
North Conway quadrangle
White Mountains Alkaline Batholith
Mountain Pond, hills around: allanite as a minor accessory mineral in the nordmarkite of the Chocorua Group: 673.
North Conway: allanite as a minor accessory in the White Mountain magma series: 859; allanite as an accessory mineral in porphyritic rhyolite of White Mountain magma series: 699.
Peaked Mountain: allanite as an accessory mineral in the Red phase of the Conway biotite granite: 673.
Redstone granite quarries, Redstone: allanite as an accessory mineral in the Red phase of the Conway biotite granite: 673.
Redstone green quarry at Conway on Redstone Ledge, operated by the Maine and New Hampshire Granite Corp.: allanite as an accessory mineral in olive green granite, of which the limonite stain comes from alteration of somewhat abundant particles and crystals of allanite: 715; allanite, mostly in biotite, as an accessory mineral in "Redstone green granite": 716.
Redstone Ledge: allanite as an accessory mineral in the Red phase of the Conway biotite granite: 673.
Robbins Ridge region: allanite as a minor accessory in the hastingsite granite of the Chocorua Group; granite is finer-textured than usual and occurs in an area primarily of biotite granite: 673.
Sable Mountain: allanite as a minor accessory mineral in the nordmarkite of the Chocorua Group: 673.

NEW HAMPSHIRE (contd.)

Carroll County (contd.)
Thorium Occurrences
North Conway quadrangle
White Mountains Alkaline Batholith
South Doublehead Mountain area: allanite as a minor accessory in the hastingsite granite of the Chocorua Group: 673.
Thompson's Falls on Moat Brook: allanite as an accessory mineral in the Red phase of the Conway biotite granite: 673.
Weeks Brook: allanite as an accessory mineral in the Red phase of the Conway biotite granite; Red phase shatters diorite here: 673.
White Mountain quarry owned by H.A. Hitner's Sons Co., Philadelphia, at Conway, 1 3/4 mi. S of North Conway, on W side of hill between Saco River and Moat Brook, SE of White Horse Ledge: allanite as an accessory mineral in medium pinkish buff gray biotite granite: 715; allanite as an accessory mineral in granite: 716.
Ossipee Mountains: allanite as an accessory mineral in porphyritic rhyolite of White Mountain magma series: 699; allanite as a minor accessory in the White Mountain magma series: 859.
Percy quadrangle: allanite as a minor accessory in the White Mountain magma series: 859.
Wakefield
East Pond: monazite in gneiss: 726.
Province Lake mine, 1 mi. WNW of Province Lake Village: allanite associated with quartz, feldspar, columbite, beryl, etc.: 860.

NEW HAMPSHIRE (contd.)

Carroll County (contd.)
Thorium Occurrences
Wakefield
Weeks mine: samarskite and chrysoberyl in pegmatite: 886.
Weeks quarry SW of Province Lake: beryl, samarskite intergrown with columbite in masses weighing up to 60 lbs. in albite, among rare and accessory minerals in pegmatite; geology, description: 690.
Uranium Occurrences
Central New England Province
Kearsarge, 2 mi. E of post office on unnumbered road to Kimbal Pond: radiometric and chemical analyses of Conway biotite granite sample, 0.005% eU and 0.001% U: 842.
Redstone, 1 mi. NE of, in granite quarry: radiometric and chemical analyses of Conway biotite granite sample, 0.006% eU, 0.001% U, and 0.002, 0.003, and 0.006% ThO_2: 842.
Wakefield
Feldspar deposit at: columbite in large black lustrous masses with small bright yellow patches scattered over the surface; chemical analysis of columbite showed 0.48% uranium: 895.
Weeks mine: samarskite and chrysoberyl in pegmatite: 886.
Weeks quarry SW of Province Lake: beryl, samarskite intergrown with columbite in masses weighing up to 60 lbs. in albite, among rare and accessory minerals in pegmatite; geology, description: 690.

(See also Carroll and Coos Counties: 842.)

NEW HAMPSHIRE (contd.)

Carroll and Coos Counties
Radioactive Rocks
Central New England Province
General: radioactive area extending S from West Milan along New Hampshire Highway 10 to Berlin and along New Hampshire Highway 16 to West Ossipee, and E to Maine border and W to Jefferson on U.S. Highway 2 to Fabyan House on U.S. Highway 302; radioactivity of crystalline and metamorphic rocks in areas mapped as Partridge gneiss, Littleton schist, Oliverian monzonites and the Bickford, Chatham, and Conway granites, 0.003-0.005% eU; level of radioactivity was essentially the same for almost all the rock types traversed: 842.

Cheshire County
Autunite Occurrences
Alstead
New Hampshire Mica and Mining Co. quarry, about 1 4/5 mi. NNW of Gilsum: autunite as an accessory mineral in small, greenish yellow flakes between albite plates and in tourmalinized wall rock of pegmatites intruded into mica schist: 856.
New Hampshire Mica and Mining Co. quarry 2 mi. N of Gilsum: autunite as small flakes or scales between albite plates and in tourmalinized part of wallrock: 857.
New Hampshire Mica and Mining Company quarry: autunite of mineralogical interest only: 859.

NEW HAMPSHIRE (contd.)

Cheshire County (contd.)

Alstead

Golding Keene mine: autunite occurs between muscovite leaves and as impregnations in microcline and masses of altered garnet; uraninite; ball-like structures, about 1 1/4 - 1 3/4 inches in diameter, containing centers of gummite and uranophane surrounded by perfect circles of altered microcline impregnated with autunite: 650; uraninite associated with its characteristic alteration minerals, autunite, gummite, and uranophane, and all of mineralogical and scientific interest only: 859.

Gummite Occurrences

Alstead

Golding Keene mine: autunite occurs between muscovite leaves and as impregnations in microcline and masses of altered garnet; uraninite; ball-like structures, about 1 1/4 - 1 3/4 inches in diameter, containing centers of gummite and uranophane surrounded by perfect circles of altered microcline impregnated with autunite: 650; uraninite associated with its characteristic alteration minerals, autunite, gummite, and uranophane, and all are of mineralogical and scientific interest only: 859.

Radioactive Rocks

Central New England Province

Keene, 1 mi. N of, on New Hampshire Highway 10: radioactivity of radioactive area 200 by 75 ft. of coarse-grained white granite in schist in area mapped as granodiorite of the Oliverian magma series, 0.005% eU; radiometric and chemical analyses of very coarse-grained quartz-feldspar-muscovite granite, 0.005% eU and less than 0.001% U, on New Hampshire Highway 10, 1.2 mi. N of junction with New Hampshire Highway 9: 842.

NEW HAMPSHIRE (contd.)

Cheshire County (contd.)

Thorium Occurrences

Alstead

Golding-Keene mine: autunite occurs between muscovite leaves and as impregnations in microcline and masses of altered garnet; uraninite; ball-like structures, about 1 1/4 - 1 3/4 inches in diameter, containing centers of gummite and uranophane surrounded by perfect circles of altered microcline impregnated with autunite: 650; uraninite associated with its characteristic alteration minerals, autunite, gummite, and uranophane, and all are of mineralogical and scientific interest only: 859.

Uraninite Occurrences

Alstead

Golding Keene mine: autunite occurs between muscovite leaves and as impregnations in microcline and masses of altered garnet; uraninite; ball-like structures, about 1 1/4 - 1 3/4 inches in diameter, containing centers of gummite and uranophane surrounded by perfect circles of altered microcline impregnated with autunite: 650; uraninite associated with its characteristic alteration minerals, autunite, gummite, and uranophane and all are of mineralogical and scientific interest only: 859.

Uranium Occurrences

Alstead

Big mine: small quantities of uranium minerals in pegmatite: 886.

NEW HAMPSHIRE (contd.)

Cheshire County (contd.)
Uranium Occurrences
Alstead
Golding Keene mine: autunite occurs between muscovite leaves and as impregnations in microcline and masses of altered garnet; uraninite; ball-like structures, about 1 1/4 - 1 3/4 inches in diameter, containing centers of gummite and uranophane surrounded by perfect circles of altered microcline impregnated with autunite: 650; uraninite associated with its characteristic alteration minerals, autunite, gummite, and uranophane, and all of mineralogical and scientific interest only: 859.
New Hampshire Mica and Mining Co. quarry about 1 4/5 mi. NNW of Gilsum: autunite as an accessory mineral in small, greenish yellow flakes between albite plates and in tourmalinized wall rock of pegmatites intruded into mica schist: 856.
New Hampshire Mica and Mining Co. quarry 2 mi. N of Gilsum: autunite as small flakes or scales between albite plates and in tourmalinized part of wallrock: 857; autunite, of mineralogical interest only: 859.
Central New England Province
Keene, 1 mi. N of, on New Hampshire Highway 10: radioactivity of radioactive area 200 by 75 ft. of coarse-grained white granite in schist in area mapped as granodiorite of the Oliverian magma series 0.005% eU; radiometric and chemical analyses of very coarse-grained quartz-feldspar-muscovite granite, 0.005% eU and less than 0.001% U, on New Hampshire Highway 10, 1.2 mi. N of junction with New Hampshire Highway 9: 842.

NEW HAMPSHIRE (contd.)

Cheshire County (contd.)
Uranophane Occurrences
Alstead
Golding Keene mine: autunite occurs between muscovite leaves and as impregnations in microcline and masses of altered garnet; uraninite; ball-like structures, about 1 1/4 - 1 3/4 inches in diameter, containing centers of gummite and uranophane surrounded by perfect circles of altered microcline impregnated with autunite: 650; uraninite associated with its characteristic alteration minerals, autunite, gummite, and uranophane, and all are of mineralogical and scientific interest only: 859.

Clarkeite Occurrences
See under individual county names and under Index III, Clarkeite Occurrences-New Hampshire: 859.

Columbite, Uranium-bearing
See under individual county names and under Index III, Columbite, Uranium-bearing-New Hampshire: 895.

Coos County
Allanite Occurrences
Dawson quarry in Stark township, 3-4 miles E. of Groveton station: allanite as an accessory mineral in "Stark" granite: 716.
Autunite Occurrences
White Mountains
Berlin: small amounts of autunite, gummite, uraninite, uranophane in pegmatite: 999.
Gummite Occurrences
White Mountains
Berlin: small amounts of autunite, gummite, uraninite, uranophane in pegmatite: 999.
Monazite Occurrences
Randolph: monazite in gneiss: 726.

NEW HAMPSHIRE (contd.)

Coos County (contd.)
Radioactive Rocks
Central New England Province
Along Connecticut River from Columbia S for 28 mi. on U.S. Highway 3 to Lancaster: radioactivity of schist and phyllite covered by glacial deposits, 0.003-0.005% eU: 842.
Dixville Notch, through notch, for a mile along New Hampshire Highway 26: radioactivity of micaceous slate in metamorphosed early Paleozoic sediments, 0.003% eU: 842.
U.S. Highway 3 about 5 mi. SW of Pittsburg: radioactivity of one outcrop of schist in metamorphosed early Paleozoic sediments, 0.003% eU: 842.
Thorium Occurrences
Dawson quarry in Stark township, 3-4 mi. E of Groveton station: allanite as an accessory mineral in "Stark" granite: 716.
Randolph: monazite in gneiss: 726.
White Mountains
Berlin: small amounts of autunite, gummite, uraninite, uranophane in pegmatite: 999.
Uraninite Occurrences
White Mountains
Berlin: small amounts of autunite, gummite, uraninite, uranophane in pegmatite: 999.
Uranium Occurrences
White Mountains
Berlin: small amounts of autunite, gummite, uraninite, uranophane in pegmatite: 999.
Uranophane Occurrences
White Mountains
Berlin: small amounts of autunite, gummite, uraninite, uranophane in pegmatite: 999.

(See also Carroll and Coos Counties: 842)

NEW HAMPSHIRE (contd.)

Cyrtolite Occurrences
See under individual county names and under Index III, Cyrtolite Occurrences-New Hampshire: 651, 690, 883, 1001.

Grafton County
Age Determinations
Ruggles mine: analysis of uraninite for age determinations gave 90.06% U_3O_8 or 76.38% U, 0.43% ThO_2 or 0.38% Th, 0.21% rare earths, age ratio 0.044, age about 327 m.y. or probably early Devonian; age ratio falls between those for Glastonbury and Branchville, Connecticut, minerals but is lower than those for Fitchburg and Blueberry Mountain, Massachusetts, minerals: 1040.
Allanite Occurrences
Canaan Center
Area 5/8 mi. NW of Canaan Center: allanite in trace amounts as an accessory mineral in the medium-grained, gneissoid quartz diorite of the Oliverian magma series on Mascoma dome: 697.
Area 1½ mi. NNW of Canaan Center: allanite in trace amounts as an accessory mineral in the medium-grained gneissoid granodiorite of the Oliverian magma series on Mascoma dome: 697.
Hill 1 3/4 mi. N of Canaan Center: allanite in trace amounts as an accessory mineral in the fine-grained gneissoid quartz diorite of the Oliverian magma series on Mascoma dome: 697.
Hill 2¼ mi. SW of Canaan Center: allanite in trace amounts in the medium-grained gneissoid granodiorite of the Oliverian magma series on Mascoma dome: 697.
Ridge 3 mi. N of Canaan Center: allanite in trace amounts in the fine-grained gneissoid granodiorite of the Oliverian magma series on Mascoma dome: 697.

NEW HAMPSHIRE (contd.)

Grafton County (contd.)
Allanite Occurrences
Enfield
Area N of Enfield: allanite in trace amounts as an accessory mineral in the fine-grained gneissoid granodiorite of the Oliverian magma series on Mascoma dome: 697.
Area near road 2½ mi. NE of Enfield: allanite and epidote make up 1% of the medium-grained gneissoid quartz monzonite of the Oliverian magma series on Mascoma dome: 697.
Hill 2¼ mi. SW of Enfield: allanite in trace amounts as an accessory mineral in the fine- to medium-grained gneissoid granodiorite of the Oliverian magma series on Mascoma dome: 697.
Enfield Center, knoll 1 3/4 mi. SSE of: allanite in trace amounts as an accessory mineral in the medium-grained, gneissoid granodiorite of the Oliverian magma series of Mascoma dome: 697.
Franconia quadrangle: allanite as an accessory mineral in porphyritic rhyolite of White Mountain magma series: 699.
Lebanon: epidote-mica-gneiss contains allanite as an accessory mineral in relatively small amounts; occasionally, allanite forms the chestnut brown, pleochroic center of epidote crystals: 727.
Mascoma dome: allanite in trace amounts in granodiorite, quartz diorite, quartz monzonite of the Oliverian magma series around Canaan Center, Enfield, Enfield Center, and South Peak of Moose Mountain: 697.
Moose Mountain
South Peak
Area near road 1¼ mi. ESE of South Peak: allanite in trace amounts in the fine- to medium-grained gneissoid granodiorite of the Oliverian magma series of Mascoma dome: 697.

NEW HAMPSHIRE (contd.)

Grafton County (contd.)
Allanite Occurrences
Moose Mountain
South Peak
Area 3/8 mi. W of summit: allanite in trace amounts as an accessory mineral in the fine-grained gneissoid quartz monzonite of the Oliverian magma series of Mascoma dome: 697.
Mount Clough pluton: minor amounts of allanite in Bethlehem gneiss and its associated pegmatites: 696.
Oliverian (Paleozoic) magma series: spectrographic analyses made of 21 samples from Mascoma dome to determine trace elements present in various types of rocks; no U, Th, or Ra listed as present but V was reported; allanite was found in 11 of the 21 samples used; methods described: 697.
Pond Ledge quarries on SE side of Briar Hill about 1 mi. from Haverhill Center and 3 mi. E of Black Mount station: allanite as an accessory mineral in "Pond Ledge gray" granite: 716.
Autunite Occurrences
Alexandria
E. E. Smith upper mine on E spur of Hutchins Hill: autunite, beryl, columbite-tantalite, among rare and accessory minerals in pegmatite; geology, description: 690.
Grafton: autunite at two old mines: 958; autunite fluorescence test with monochromator: 963.
Carpenter mine: traces of autunite and torbernite among rare and accessory minerals in pegmatite; geology, description: 690.
Feldspar quarry near: autunite, gummite: 658.

NEW HAMPSHIRE (contd.)

Grafton County (contd.)
Autunite Occurrences
Grafton
Ruggles mine, 1.5 mi. NW of Grafton Center: autunite, columbite, graftonite, gummite surrounding uraninite with possibly some associated clarkeite, minute amounts of torbernite as small scales or as clusters of crystals, uraninite, and uranophane as an alteration product of uraninite and associated with gummite; none of the minerals is of commercial value but all are of mineralogical or scientific interest: 859; autunite, cyrtolite, gummite, torbernite, uranophane: 651; autunite, graftonite, columbite, uraninite, uranophane among minerals in mine operated by Bon Ami Co. for feldspar in pegmatite: 646; autunite, gummite, uraninite, and rare phosphates in pegmatite: 974; autunite, gummite, torbernite, uranophane among minerals found at this mica mine: 1061; autunite with uranocircite, uranospinite, decomposition product of uraninite closely resembling uranophane and may be a new species: 958; parsonsite in pegmatite as crusts of microscopic spicular or lath-like, crystals occurs sparingly along fracture surfaces in massive feldspar and quartz near the uraninite and gummite masses, and associated with autunite and phosphuranylite derived from alteration of primary uraninite: 757; pegmatites with dendritic uraninite, gummite, autunite, and other minerals: 1053; uraninite as small black spots and radiating dendrites, torbernite in small clusters of crystals but rare in this locality, gummite, uranophane (?) associated with gummite, autunite in finely formed tabular crystals; minerals occur in pegmatites but not in commercial quantities: 647.

NEW HAMPSHIRE (contd.)

Grafton County
Autunite Occurrences
Groton
Palermo No. 1 mine (or Palermo mica mine), on Bald Face Mountain, 1.5 mi. SW of North Groton: autunite, uranium oxide in golden beryl in pegmatite deposits: 835.
Mount Clough pluton of Bethlehem gneiss: autunite, uraninite, columbite among minerals present in pegmatite: 774.
North Groton, abandoned mine at: autunite, uranophane on dumps; mined from pegmatite: 1000.
Orange: autunite: 958.
Palermo quarry near North Groton: pegmatite showing three stages of mineralization with the following uranium minerals being introduced during the hydrothermal stage: gummite as small orange yellow masses, an alteration of uraninite occurring in secondary muscovite; uranophane, an alteration of uraninite occurring as a yellow coating on muscovite and microcline; autunite as small, perfect thin tabular crystals in cavities formerly occupied by uraninite and also in muscovite; cyrtolite as brownish red or chocolate colored crystals associated with or near secondary uranium minerals: 1001.
Clarkeite Occurrences
Grafton
Ruggles mine, 1.5 mi. NW of Grafton Center:
autunite, columbite, graftonite, gummite surrounding uraninite with possibly some associated clarkeite, minute amounts of torbernite as small scales or as clusters of crystals, uraninite, and uranophane as an alteration product of uraninite and associated with gummite; none of the minerals is of

NEW HAMPSHIRE (contd.)

Grafton County (contd.)
Clarkeite Occurrences
Grafton
Ruggles mine, 1.5 mi. NW of Grafton Center:
commercial value but all are of mineralogical or scientific interest: 859.
Cyrtolite Occurrences
Grafton
Grafton mine: autunite, cyrtolite, gummite, torbernite, uranophane: 651.
Ruggles mine, 1.5 mi. NW of Grafton Center: cyrtolite, gummite, uraninite, uranophane in pegmatite: 883.
Groton
Palermo No. 1 mine (or Palermo mica mine), on Bald Face Mountain, 1.5 mi. SW of North Groton: autunite, beryl, columbite-tantalite, cyrtolite, gummite, uranophane, zircon among rare and accessory minerals in pegmatite; geology, description: 690.
Palermo quarry near North Groton: pegmatite showing three stages of mineralization with the following uranium minerals being introduced during the hydrothermal stage: gummite as small orange yellow masses, an alteration of uraninite occurring in secondary muscovite; uranophane, an alteration of uraninite occurring as a yellow coating on muscovite and microcline; autunite as small, perfect thin tabular crystals in cavities formerly occupied by uraninite and also in muscovite; cyrtolite as brownish red or chocolate colored crystals associated with or near secondary uranium minerals: 1001.

NEW HAMPSHIRE (contd.)

Grafton County (contd.)
Gummite Occurrences
Grafton
Feldspar quarry near Grafton: autunite, gummite: 658.
Grafton mine: autunite, cyrtolite, gummite, torbernite, uranophane: 651.
Ruggles mine, 1.5 mi. NW of Grafton Center: autunite, columbite, graftonite, gummite surrounding uraninite with possibly some associated clarkeite, minute amounts of torbernite as small scales or as clusters of crystals, uraninite, and uranophane as an alteration product of uraninite and associated with gummite; none of the minerals is of commercial value but all are of mineralogical of scientific: 859; autunite, gummite, torbernite, uraninite, uranophane, zircon among rare and accessory minerals in pegmatite; geology, description: 690; autunite, gummite, uraninite, and rare phosphates in pegmatite: 974; autunite, gummite, torbernite, uranophane among minerals found at this mica mine: 1061; cyrtolite, gummite, uraninite, uranophane, in pegmatites: 883; parsonsite in pegmatite as crusts of microscopic spicular or lath-like crystals occurs sparingly along fracture surfaces in massive feldspar and quartz near the uraninite and gummite masses, and associated with autunite and phosphuranylite derived from alteration of primary uraninite: 757; pegmatites with dendritic uraninite, gummite, autunite, and other minerals: 1053;

NEW HAMPSHIRE (contd.)

Grafton County (contd.)
Gummite Occurrences
Grafton
Ruggles mine, 1.5 mi. NW of Grafton Center: uraninite as small black spots and radiating dendrites, torbernite in small clusters of crystals but rare in this locality, gummite, uranophane(?) associated with gummite, autunite in finely formed tabular crystals; minerals occur in pegmatites but not in commercial quantities: 647.
Groton
Palermo No. 1 mine (or Palermo mica mine), on Bald Face Mountain, 1.5 mi. SW of North Groton; autunite, beryl, columbite-tantalite cyrtolite, gummite, uranophane, zircon among rare and accessory minerals in pegmatite; geology, description: 690.
Palermo quarry near North Groton: pegmatite showing three stages of mineralization with the following uranium minerals being introduced during the hydrothermal stage: gummite as small orange yellow masses, an alteration of uraninite occurring in secondary muscovite; uranophane, an alteration of uraninite occurring as a yellow coating on muscovite and microcline; autunite as small, perfect thin tabular crystals in cavities formerly occupied by uraninite and also in muscovite; cyrtolite as brownish red or chocolate colored crystals associated with or near secondary uranium minerals: 1001.
Parsonsite Occurrences
Grafton
Ruggles mine, 1.5 mi. NW of Grafton Center: parsonsite in pegmatite as crusts of microscopic spicular or lath-like crystals occurs sparingly along fracture surfaces in massive feldspar and quartz near the uraninite and gummite masses, and associated with autunite and phosphuranylite derived from alteration of primary uraninite: 757; parsonsite, mineralogy: 757; parsonsite, chemical analysis showed 34.68% UO_3: 757.

NEW HAMPSHIRE (contd.)

Grafton County (contd.)
Phosphuranylite Occurrences
Grafton
Ruggles mine, 1.5 mi. NW of Grafton Center: parsonsite in pegmatite as crusts in microscopic spicular or lath-like crystals occurs sparingly along fracture surfaces in massive feldspar and quartz near the uraninite and gummite masses, and associated with autunite and phosphuranylite derived from alteration of primary uraninite: 757.
Radioactive Rocks
Central New England Province
Plymouth 40 mi. N along U.S. Highway 3 to 12 mi. N of North Woodstock: radioactivity of granitic rocks and schists in area mapped as Conway granite, Kinsman quartz monzonite, and Littleton schist, 0.003-0.005% eU: 842.
Plymouth, S for 11 mi. along New Hampshire Highway 25: radioactivity of schist and glacial material in area mapped as Littleton schist, 0.003-0.005% eU; few outcrops; most of radioactivity in glacial material: 842.
Grafton
Ruggles mine, 1.5 mi. NW of Grafton Center: pegmatite, radioactivity, mean value of activity index, 0.50 ± 0.05 alpha/mg/hr.: 745; radioactivity determinations on a sample of a pegmatite dike submitted by M.P. Billings gave 1.70×10^{-5}cc He/g., 2.16×10^{-13}g. Ra/g., 0.68×10^{-6}g. Th/g., age 68 m.y.; similar studies by Goodman and Keevil on a sample of a pegmatite dike gave respectively 1.0 and 0.93×10^{-5}cc.

NEW HAMPSHIRE (contd.)

Grafton County (contd.)
Radioactive Rocks
Grafton
Ruggles mine, 1.5 mi. NW of Grafton Center:
He/g., alpha counts of 0.35-0.48 and 0.56-0.59, age 74 and 50 m.y.: 746.
Hanover: Lebanon granite, radioactivity, mean value of activity index, 2.3 ± 0.3 alpha/mg/hr.: 745.
Thorium Occurrences
Canaan Center
Area 5/8 mi. NW of Canaan Center: allanite in trace amounts as an accessory mineral in the medium-grained, gneissoid quartz diorite of the Oliverian magma series on Mascoma dome: 697.
Area 1½ mi. NNW of Canaan Center: allanite in trace amounts as an accessory mineral in the medium-grained gneissoid granodiorite of the Oliverian magma series on Mascoma dome: 697.
Ridge 3 mi. N of Canaan Center: allanite in trace amounts in the fine-grained gneissoid granodiorite of the Oliverian magma series on Mascoma dome: 697.
Hill 2¼ mi. SW of Canaan Center: allanite in trace amounts in the medium-grained gneissoid granodiorite of the Oliverian magma series on Mascoma dome: 697.
Hill 1 3/4 mi. N of Canaan Center: allanite in trace amounts as an accessory mineral in the fine-grained gneissoid quartz diorite of the Oliverian magma series on Mascoma dome: 697.
Enfield
Area near road 2½ mi. NE of Enfield: allanite and epidote make up 1% of the medium-grained gneissoid quartz monzonite of the Oliverian magma series on Mascoma dome: 697.
Area N of Enfield: allanite in trace amounts as an accessory mineral in the fine-grained gneissoid granodiorite of the Oliverian magma series on Mascoma dome: 697.

NEW HAMPSHIRE (contd.)

Grafton County (contd.)
Thorium Occurrences
Enfield
Hill 2¼ mi. SW of Enfield: allanite in trace amounts as an accessory mineral in the fine- to medium-grained gneissoid granodiorite of the Oliverian magma series on Mascoma dome: 697.
Enfield Center, knoll 1 3/4 mi. SSE of: allanite in trace amounts as an accessory mineral in the medium-grained, gneissoid granodiorite of the Oliverian magma series of Mascoma dome: 697.
Enfield Township, Pegmatite in Littleton schists 2 mi. E of Spectacle Pond: uraninite; age determination by lead-uranium ratio gave 304 m.y. (late Devonian): 694.
Franconia quadrangle: allanite as an accessory mineral in porphyritic rhyolite of White Mountain magma series: 699.
Grafton
Grafton mine: autunite, cyrtolite, gummite, torbernite, uranophane: 651.
Ruggles mine, 1.5 mi. NW of Grafton Center: autunite, columbite, graftonite, gummite surrounding uraninite with possibly some associated clarkeite, minute amounts of torbernite as small scales or as clusters of crystals, uraninite and uranophane as an alteration product of uraninite and associated with gummite; none of the minerals is of commercial value but all are of mineralogical or scientific interest: 859; autunite, graftonite, columbite, uraninite, uranophane among minerals in mine operated by Bon Ami Co. for feldspar in pegmatite: 646;

NEW HAMPSHIRE (contd.)

Grafton County (contd.)
Thorium Occurrences
Grafton
Ruggles mine, 1.5 mi. NW of Grafton Center: autunite, gummite, torbernite, uraninite, uranophane zircon among rare and accessory minerals in pegmatite; geology, description: 690; cyrtolite, gummite, uraninite, uranophane in pegmatites: 883; parsonsite in pegmatite as crusts of microscopic spicular or lath-like crystals occurs sparingly along fracture surfaces in massive feldspar and quartz near the uraninite and gummite masses, and associated with autunite and phosphuranylite derived from alteration of primary uraninite: 757; parsonsite, chemical analysis showed 34.68% UO_3: 757; parsonsite, mineralogy: 757; pegmatites with dendritic uraninite, gummite, autunite, and other minerals: 1053; uraninite: 70; uraninite and other uranium-bearing and rare earth minerals in pegmatite: 946; uraninite as small black spots and radiating dendrites, torbernite in small clusters of crystals but rare in this locality, gummite, uranophane(?) associated with gummite, autunite in finely formed tabular crystals; minerals occur in pegmatites but not in commercial quantities: 647; uraninite from pegmatite mine under intensive study by Shaub as to its age, alteration products, and its relationship, if any, to the Canadian Wilberforce and other uraninite and radioactive minerals in Ontario and Quebec; mineralogical and microchemical work to be continued: 830; uraninite in all stages of alteration in new pit opened in Ruggles pegmatite by Whitehall Company of New York: 948;

NEW HAMPSHIRE (contd.)

Grafton County (contd.)
Thorium Occurrences
Grafton
Ruggles mine, 1.5 mi. NW of Grafton Center: crystal habit of uraninite: 948; mode of occurrences of uraninite: 948; analysis of uraninite for age determinations gave 90.06% U_3O_8 or 76.38% U, 0.43% ThO_2 or 0.38% Th, 0.21% rare earths, age ratio 0.044, age about 327 m.y. or probably early Devonian; age ratio falls between those for Glastonbury and Branchville, Connecticut, minerals but is lower than those for Fitchburg and Blueberry Mountain, Massachusetts, minerals: 1040; uraninite; microchemical analysis gave 0.38% Th and 76.38% U: 943; chemical composition of uraninite, 0.43% ThO_2 (Th, 0.38), 90.06% U_3O_8 (U, 76.38), Pb/U ratio 0.041, and geologic age approximately 304 m.y. or late Devonian: 948; chemical analysis of uraninite gave 76.38% U, 0.38% Th, and an age of 310 m.y.: 925.

Groton
Palermo No. 1 mine (or Palermo mica mine), on Bald Face Mountain, 1.5 mi. SW of North Groton: autunite, beryl, columbite-tantalite, cyrtolite, gummite, uranophane zircon, among rare and accessory minerals in pegmatite; geology, description: 690;
Palermo pegmatite: uraninite: 70.
Lebanon: epidote-mica-gneiss contains allanite as an accessory mineral in relatively small amounts; occasionally, allanite forms the chestnut brown, pleochroic center of epidote crystals: 727.

NEW HAMPSHIRE (contd.)

Grafton County (contd.)
Thorium Occurrences
Mascoma dome: allanite in trace amounts in granodiorite, quartz diorite, quartz monzonite of the Oliverian magma series around Canaan Center, Enfield, Enfield Center, and South Peak of Moose Mountain: 697.
Moose Mountain
South Peak
Area near road 1¼ mi. ESE of South Peak: allanite in trace amounts in the fine- to medium-grained gneissoid granodiorite of the Oliverian magma series of Mascoma dome: 697; allanite in trace amounts as an accessory mineral in the fine-grained gneissoid quartz monzonite of the Oliverian magma series of Mascoma dome: 697.
Mount Clough pluton of Bethlehem gneiss: autunite, uraninite, columbite among minerals present in pegmatite: 774; minor amounts of allanite in Bethlehem gneiss and its associated pegmatites: 696.
Oliverian (Paleozoic) magma series: spectrographic analyses made of 21 samples from Mascoma dome to determine trace elements present in various types of rocks; no U, Th, or Ra listed as present but V was reported; allanite was found in 11 of the 21 samples used; methods described: 697.
Palermo quarry near North Groton: pegmatite showing three stages of mineralization with the following uranium minerals being introduced during the hydrothermal stage; gummite as small orange yellow masses, an alteration of uraninite occurring in secondary muscovite; uranophane, an alteration of uraninite occurring as a yellow coating on muscovite and microcline; autunite as small, perfect thin tabular crystals in cavities formerly occupied by uraninite and also in

NEW HAMPSHIRE (contd.)

Grafton County (contd.)
Thorium Occurrences
Palermo quarry near North Groton: muscovite; cyrtolite as brownish red or chocolate colored crystals associated with or near secondary uranium minerals: 1001.
Pond Ledge quarries on SE side of Briar Hill about 1 mi. from Haverhill Center and 3 mi. E of Black Mount station: allanite as an accessory mineral in "Pond Ledge gray" granite: 716.
Torbernite Occurrences
Grafton
Carpenter mine: traces of autunite and torbernite among rare and accessory minerals in pegmatite; geology, description: 690.
Grafton mine: autunite, cyrtolite, gummite, torbernite, uranophane: 651.
Ruggles mine 1.5 mi. NW of Grafton Center: autunite, columbite, graftonite, gummite surrounding uraninite with possibly some associated clarkeite, minute amounts of torbernite as small scales or as clusters of crystals, uraninite, and uranophane as an alteration product of uraninite and associated with gummite; none of the minerals is of commercial value but all are of mineralogical or scientific interest: 859; autunite, gummite, torbernite uranophane among minerals found at this mica mine: 1061; autunite, gummite, torbernite, uraninite, uranophane, zircon among rare and accessory minerals in pegmatite; geology, description: 690;

NEW HAMPSHIRE (contd.)

Grafton County (contd.)

Torbernite Occurrences

Grafton

Ruggles mine, 1.5 mi. NW of Grafton Center: uraninite as small black spots and radiating dendrites, torbernite in small clusters of crystals but rare in this locality, gummite, uranophane(?) associated with gummite, autunite in finely formed tabular crystals; minerals occur in pegmatites but not in commercial quantities: 647.

Uraninite Occurrences

Enfield Township

Pegmatite in Littleton schists 2 mi. E of Spectacle Pond: uraninite; age determination by lead-uranium ratio gave 304 m.y. (late Devonian): 694.

Grafton

[illegible]

Ruggles mine, 1.5 mi. NW of Grafton Center: autunite, columbite, graftonite, gummite surrounding uraninite with possibly some associated clarkeite, minute amounts of torbernite as small scales or as clusters of crystals, uraninite, and uranophane as an alteration product of uraninite and associated with gummite; none of the minerals is of commercial value but all are of mineralogical or scientific interest: 859; autunite, graftonite, columbite, uraninite, uranophane among minerals in mine operated by Bon Ami Co. for feldspar in pegmatite: 646; autunite, gummite, torbernite, uraninite, uranophane, zircon, among rare and accessory minerals in pegmatite; geology, description: 690; autunite, gummite, uraninite, and rare phosphates in pegmatite: 974.

NEW HAMPSHIRE (contd.)

Grafton County (contd.)

Uraninite Occurrences

Grafton

Ruggles mine, 1.5 mi. NW of Grafton Center: autunite with uranocircite, uranospinite, decomposition product of uraninite closely resembling uranophane and may be a new species: 958; cyrtolite, gummite, uraninite, uranophane, in pegmatites: 883; parsonsite in pegmatite as crusts of microscopic spicular or lath-like crystals occurs sparingly along fracture surfaces in massive feldspar and quartz near the uraninite and gummite masses, and associated with autunite and phosphuranylite derived from alteration of primary uraninite: 757; pegmatites with dendritic uraninite, gummite, autunite, and other minerals: 1053; quartz veins in pegmatite carrying smoky quartz, uraninite, and many secondary uranium minerals: 648; uraninite: 70, 943; uraninite and other uranium-bearing and rare earth minerals in pegmatite: 946; uraninite in all stages of alteration in new pit opened in Ruggles pegmatite by Whitehall Company of New York: 948; uraninite as small black spots and radiating dendrites, torbernite in small clusters of crystals but rare in this locality, gummite, uranophane(?) associated with gummite, autunite in finely formed tabular crystals; minerals occur in pegmatites but not in commercial quantities: 647; uraninite from pegmatite mine under intensive study by Shaub as to its age, alteration

NEW HAMPSHIRE (contd.)

Grafton County (contd.)
Uraninite Occurrences
Grafton
Ruggles mine, 1.5 mi. NW of Grafton Center:
products, and its relationship, if any, to the Canadian Wilberforce and other uraninite and radioactive minerals in Ontario and Quebec; mineralogical and microchemical work to be continued: 830; uraninite mineralogy: 943; crystal habit of uraninite: 948; mode of occurrences of uraninite: 948; age determination of uraninite gave an age of 302 m.y. or Devonian: 943; analysis of uraninite for age determinations gave 90.06% U_3O_8 or 76.38% U, 0.43% ThO_2 or 0.38% Th, 0.21% rare earths, age ratio 0.044, age about 327 m.y. or probably early Devonian; age ratio falls between those for Glastonbury and Branchville, Connecticut, minerals but is lower than those for Fitchburg and Blueberry Mountain, Massachusetts minerals: 1040; chemical analysis of uraninite gave 76.38% U and 0.38% Th and age of 310 m.y.: 925; chemical composition of uraninite, 0.43% ThO_2 (Th, 0.38), 90.06% U_3O_8 (U, 76.38), Pb/U ratio 0.041, and geologic age approximately 304 m.y. or late Devonian: 948; microchemical analysis of uraninite gave 0.38% thorium and 76.38% uranium: 943; geology: 648; structure: 648.
Groton
Palermo pegmatite: uraninite: 70.
Mount Clough pluton of Bethlehem gneiss: autunite, uraninite, columbite among minerals present in pegmatite: 774.

NEW HAMPSHIRE (contd.)

Grafton County (contd.)
Uranium Occurrences
Alexandria
E. E. Smith upper mine on E spur of Hutchins Hill: autunite, beryl, columbite-tantalite, among rare and accessory minerals in pegmatite; geology, description: 690; small quantities of uranium minerals in pegmatites: 886.
Enfield Township
Pegmatite in Littleton schists 2 mi. E of Spectacle Pond: uraninite; age determination by lead-uranium ratio gave 304 m.y. (late Devonian): 694.
Grafton: autunite at two old mines: 958; autunite; fluorescence test with monochromator: 963.
Carpenter mine: traces of autunite and torbernite among rare and accessory minerals in pegmatite; geology, description: 690; small quantities of uranium minerals in pegmatite: 886.
Feldspar quarry near Grafton: autunite, gummite: 658.
Grafton mine: autunite, cyrtolite, gummite, torbernite, uranophane: 651.
Ruggles mine, 1.5 mi. NW of Grafton Center: autunite, columbite, graftonite, gummite surrounding uraninite with possibly some associated clarkeite, minute amounts of torbernite as small scales or as clusters of crystals, uraninite, and uranophane as an alteration product of uraninite and associated with gummite; none of the minerals is of commercial value but all are of mineralogical or scientific interest: 859;

NEW HAMPSHIRE (contd.)

Grafton County (contd.)
Uranium Occurrences
Grafton
Ruggles mine, 1.5 mi. NW of Grafton Center: autunite, graftonite, columbite, uraninite, uranophane among minerals in mine operated by Bon Ami Co. for feldspar in pegmatite: 646; autunite, gummite, torbernite, uraninite, uranophane, zircon among rare and accessory minerals in pegmatite; geology, description: 690; autunite, gummite, torbernite, uranophane among minerals found at this mica mine: 1061; autunite, gummite, uraninite, and rare phosphates in pegmatite: 974; autunite with uranocircite, uranospinite, decomposition product of uraninite closely resembling uranophane and may be a new species: 958; cyrtolite, gummite, uraninite, uranophane in pegmatites: 883; parsonsite in pegmatite as crusts of microscopic spicular or lath-like crystals occurs sparingly along fracture surfaces in massive feldspar and quartz near the uraninite and gummite masses, and associated with autunite and phosphuranylite derived from alteration of primary uraninite: 757; parsonsite, chemical analysis showed 34.68% UO_3: 757; parsonsite, mineralogy: 757; pegmatites with dendritic uraninite, gummite, autunite, and other minerals: 1053; quartz veins in pegmatite carrying smoky quartz, uraninite, and many secondary uranium minerals: 648; small quantities of uranium minerals in pegmatite: 886; uraninite: 70, 943; uraninite in all stages of alteration in new pit opened in Ruggles pegmatite by Whitehall Company of New York: 948; uraninite and other uranium-bearing and rare earth minerals in pegmatite: 946;

NEW HAMPSHIRE (contd.)

Grafton County (contd.)
Uranium Occurrences
Grafton
Ruggles mine, 1.5 mi. NW of Grafton center: uraninite from pegmatite mine under intensive study by Shaub as to its age, alteration products, and its relationship, if any, to the Canadian Wilberforce and other uraninite and radioactive minerals in Ontario and Quebec; mineralogical and microchemical work to be continued: 830; uraninite as small black spots and radiating dendrites, torbernite in small clusters of crystals but rare in this locality, gummite, uranophane(?) associated with gummite, autunite in finely formed tabular crystals; minerals occur in pegmatites but not in commercial quantities: 647; uraninite mineralogy: 943; crystal habit of uraninite: 948; mode of occurrence of uraninite: 948; age determination of uraninite gave an age of 302 m.y. or Devonian: 943; analysis of uraninite for age determinations gave 90.06% U_3O_8 or 76.38% U, 0.43% ThO_2 or 0.38% Th, 0.21% rare earths, age ratio 0.044, age about 327 m.y. or probably early Devonian; age ratio falls between those for Glastonbury and Branchville, Connecticut, minerals but is lower than those for Fitchburg and Blueberry Mountain, Massachusetts, minerals: 1040; chemical analysis of uraninite gave 76.38% U, 0.38% Th, and an age of 310 m.y.: 925;

NEW HAMPSHIRE (contd.)

Grafton County (contd.)
Uranium Occurrences
Grafton
Ruggles mine, 1.5 mi. NW of Grafton Center:
chemical composition of uraninite, 0.43% ThO_2 (Th, 0.38), 90.06% U_3O_8 (U, 76.38), Pb/U ratio 0.041, and geologic age approximately 304 m.y. or late Devonian: 948; microchemical analysis of uraninite gave 0.38% thorium and 76.38% uranium: 943; geology: 648; structure: 648.
Groton
Palermo No. 1 mine (or Palermo mica mine), on Bald Face Mountain, 1.5 mi. SW of North Groton: autunite, beryl, columbite-tantalite, cyrtolite, gummite, uranophane, zircon among rare and accessory minerals in pegmatite; geology, description: 690; autunite, uranium oxide in golden beryl in pegmatite deposits: 835; granite pegmatite, from which mica is mined, is intruded into Montalban schist and contains graftonite, muscovite, biotite, almandite garnet coated with a uranium mineral, probably uranochalcite, and a few small zircon crystals: 668; uranochalcite coating almandite garnet, of no commercial value: 859; small quantities of uranium minerals in pegmatite: 886.
Palermo pegmatite: uraninite: 70.
Mount Clough pluton of Bethlehem gneiss: autunite, uraninite, columbite among minerals present in pegmatite: 774.
North Groton, abandoned mine at: autunite, uranophane on dumps; mined from pegmatite: 1000.
Orange: autunite: 958.

NEW HAMPSHIRE (contd.)

Grafton County (contd.)
Uranium Occurrences
Palermo quarry near North Groton: pegmatite showing three stages of mineralization with the following uranium minerals being introduced during the hydrothermal stage: gummite as small orange yellow masses, an alteration of uraninite occurring in secondary muscovite; uranophane, an alteration of uraninite occurring as a yellow coating on muscovite and microcline; autunite as small, perfect thin tabular crystals in cavities formerly occupied by uraninite and also in muscovite; cyrtolite as brownish red or chocolate colored crystals associated with or near secondary uranium minerals: 1001.
Uranochalcite Occurrences
Groton
Palermo No. 1 mine (or Palermo mica mine), on Bald Face Mountain, 1.5 mi. SW of North Groton: granite pegmatite, from which mica is mined, is intruded into Montalban schist and contains graftonite, muscovite, biotite, almandite garnet coated with a uranium mineral, probably uranochalcite, and a few small zircon crystals: 668; uranochalcite coating almandite garnet, of no commercial value: 859.
Uranocircite Occurrences
Grafton
Ruggles mine, 1.5 mi. NW of Grafton Center: autunite with uranocircite, uranospinite, decomposition product of uraninite closely resembling uranophane and may be a new species: 958.

NEW HAMPSHIRE (contd.)

Grafton County (contd.)
Uranophane Occurrences
Grafton
Ruggles mine, 1.5 mi. NW of Grafton Center: autunite, columbite, graftonite, gummite surrounding uraninite with possibly some associated clarkeite, minute amounts of torbernite as small scales or as clusters of crystals, uraninite, and uranophane as an alteration product of uraninite and associated with gummite; none of the minerals is of commercial value but all are of mineralogical or scientific interest: 859; autunite, cyrtolite, gummite, torbernite, uranophane: 651; autunite, graftonite, columbite, uraninite, uranophane among minerals in mine operated by Bon Ami Co. for feldspar in pegmatite: 646; autunite, gummite, torbernite, uraninite, uranophane, zircon among rare and accessory minerals in pegmatite; geology, description: 690; autunite, gummite, torbernite uranophane among minerals found at this mica mine: 1061; cyrtolite, gummite, uraninite, uranophane in pegmatites: 883; autunite with uranocircite, uranospinite, decomposition product of uraninite closely resembling uranophane and may be a new species: 958; uraninite as small black spots and radiating dendrites, torbernite in small clusters of crystals but rare in this locality, gummite, uranophane(?) associated with gummite, autunite in finely formed tabular crystals; minerals occur in pegmatites but not in commercial quantities: 647.
Groton
Palermo No. 1 mine (or Palermo mica mine), on Bald Face Mountain, 1.5 mi. SW of North Groton: autunite, beryl, columbite-tantalite, cyrtolite, gummite, uranophane, zircon

NEW HAMPSHIRE (contd.)

Grafton County (contd.)
Uranophane Occurrences
Groton
Palermo No. 1 mine (or Palermo mica mine), on Bald Face Mountain, 1.5 mi. SW of North Groton:
among rare and accessory minerals in pegmatite; geology, description: 690.
North Groton, abandoned mine at: autunite, uranophane on dumps; mined from pegmatite: 1000.
Palermo quarry near North Groton: pegmatite showing three stages of mineralization with the following uranium minerals being introduced during the hydrothermal stage: gummite as small orange yellow masses, an alteration of uraninite occurring in secondary muscovite; uranophane, an alteration of uraninite occurring as a yellow coating on muscovite and microcline; autunite as small, perfect thin tabular crystals in cavities formerly occupied by uraninite and also in muscovite; cyrtolite as brownish red or chocolate colored crystals associated with or near secondary uranium minerals: 1001.
Uranospinite Occurrences
Grafton
Ruggles mine, 1.5 mi. NW of Grafton Center: autunite with uranocircite, uranospinite, decomposition product of uraninite closely resembling uranophane and may be a new species: 958.

Gummite Occurrences
See under individual county names and under Index III, Gummite Occurrences-New Hampshire: 647, 650, 651, 658, 690, 757, 859, 883, 974, 999, 1001, 1053, 1061, 1079.

NEW HAMPSHIRE (contd.)

Hillsboro County
Allanite Occurrences
Bodwell quarry 2½ mi. ENE of Manchester city hall: allanite as an accessory mineral in granite: 716.
Fessenden quarry 1/8 mi. W of South Brookline station in Brookline: allanite as an accessory mineral in "Brookline" granite: 716.
Kennard Ledge quarry 1½ mi. NE of Manchester city hall: allanite as an accessory mineral in granite: 716.
Manchester: allanite in granite: 859.
Milford: allanite in granite: 859; allanite, magnetite, and zircon as accessory minerals in pegmatite dikes cutting granites in various quarries in the area: 715.
Carlton quarry 2 mi. NW of Milford: allanite as an accessory mineral in the medium pinkish gray quartz monzonite granite: 715; allanite as an accessory mineral in quartz monzonite granite: 716.
Hayden quarry 1/2 mi. NW of Federal Hill: allanite as an accessory mineral in the dark medium-bluish gray quartz monzonite granite and in the small pegmatite dikes cutting the main mass of rock: 715.
Kittredge quarry in South Milford on NE side of oblong hill: allanite as an accessory mineral in the quartz monzonite granite: 715; allanite as an accessory mineral in quartz monzonite granite; rock is light cream color in upper reaches because of limonite coming from magnetite and allanite particles: 716.
Lovejoy quarry in South Milford on SW side of oblong hill, operated by Lovejoy Granite Co.: allanite as an accessory mineral in the quartz monzonite granite: 715; allanite as an accessory mineral in "Milford" granite: 716.

NEW HAMPSHIRE (contd.)

Hillsboro County (contd.)
Allanite Occurrences
Milford
New Westerly quarry, operated by New Westerly Granite Co. 2¼ mi. NW of Milford: allanite as an accessory mineral in the "New Westerly blue," a medium slightly bluish-gray quartz monzonite granite: 715, 716.
Souhegan quarry 2½ mi. SE of Milford and 3/5 mi. SW of Federal Hill operated by Daniels Granite Co.: allanite as an accessory mineral in dark gray quartz monzonite granite: 715, 716.
[illegible] mi. [illegible] of Milford: allanite as an accessory mineral in [illegible] granite: 716.
Tonella King quarry 2¼ mi. SW of Milford: allanite as an accessory mineral in quartz monzonite granite and limonite as a secondary mineral from allanite: 716.
Tonella old quarry in South Milford: allanite as an accessory mineral in the quartz monzonite granite: 715; allanite as an accessory mineral in quartz monzonite granite, as well as in gneiss attached to granite: 716.
Tonella new quarry about 1 mi. SW of the Tonella old quarry: allanite as an accessory mineral in medium buff-gray quartz monzonite granite, in a pinkish granite occurring beside a dike, and in a large inclusion of gneiss: 715.
Young quarry* 3/4 mi. SW of East Milford or *1¼ mi. SE of Milford and Laurel post-office: allanite, possibly amounting to about 1% of the total estimated mineral percentage of the "dark-blue Westerly," a dark-gray quartz monzonite

NEW HAMPSHIRE (contd.)

Hillsboro County (contd.)
Allanite Occurrences
Milford
Young quarry 3/4 mi. SW of East Milford or Laurel post-office: granite, of which allanite is an accessory mineral both in the granite and the small pegmatite dikes that cut it: 715;
allanite as an accessory mineral in "dark-blue New Westerly" granite with limonite staining around the allanite: 716.
Radioactive Rocks
Central New England Province
Greenville, N of, for 2 mi. along New Hampshire Highway 31: radioactivity of schist in area mapped as Hubbardston granite with Brimfield schist or Concord granite and Littleton schist, 0.003% eU; radioactivity of granite outcrops bordering schist, 0.002% eU: 842.
Peterborough, 5 mi. E of, on New Hampshire Highway 101: radioactivity of 250-ft. outcrop of medium-grained yellow granite in area mapped as Hubbardston granite, 0.004% eU: 842.
Thorium Occurrences
Bodwell quarry 2½ mi. ENE of Manchester City hall: allanite as an accessory mineral in granite: 716.
Fessenden quarry 1/8 mi. W of South Brookline station in Brookline: allanite as an accessory mineral in "Brookline" granite: 716.
Kennard Ledge quarry 1½ mi. NE of Manchester city hall: allanite as an accessory mineral in granite: 716.
Manchester: allanite in granite: 859.
Milford: allanite in granite: 859; allanite, magnetite, and zircon as accessory minerals in pegmatite dikes cutting granites in various quarries in the area: 715.

NEW HAMPSHIRE (contd.)

Hillsboro County (contd.)
Thorium Occurrences
Milford
Carlton quarry 2 mi. NW of Milford: allanite as an accessory mineral in the medium pinkish gray quartz monzonite granite: 715; allanite as an accessory mineral in quartz monzonite granite: 716.
Hayden quarry ½ mi. NW of Federal Hill: allanite as an accessory mineral in the dark medium-bluish gray quartz monzonite granite and in the small pegmatite dikes cutting the main mass of rock: 715.
Kittredge quarry in South Milford on NE side of oblong hill: allanite as an accessory mineral in the quartz monzonite granite: 715; allanite as an accessory mineral in quartz monzonite granite; rock is light cream color in upper reaches because of limonite coming from magnetite and allanite particles: 716.
Lovejoy quarry in South Milford on SW side of oblong hill, operated by Lovejoy Granite Co.: allanite as an accessory mineral in the quartz monzonite granite: 715; allanite as an accessory mineral in "Milford" granite: 716.
New Westerly quarry, operated by New Westerly Granite Co. 2¼ mi. NW of Milford: allanite as an accessory mineral in the "New Westerly blue," a medium slightly bluish-gray quartz monzonite granite: 715; allanite as an accessory mineral in "New Westerly blue" granite: 716.
Souhegan quarry 2½ mi. SE of Milford and 3/5 mi. SW of

NEW HAMPSHIRE (contd.)

Hillsboro County (contd.)
Thorium Occurrences
Milford
Souhegan quarry 3/5 mi. SW of Federal Hill, operated by Daniels Granite Co.: allanite as an accessory mineral in dark gray quartz monzonite granite: 715,716.

Tonella King quarry 2¼ mi. SW of Milford: allanite as an accessory mineral in quartz monzonite granite and limonite as a secondary mineral from allanite: 716.
Tonella old quarry in South Milford: allanite as an accessory mineral in the quartz monzonite granite: 715; allanite as an accessory mineral in quartz monzonite granite, as well as in gneiss attached to granite: 716.
Tonella new quarry about 1 mi. SW of the Tonella old quarry: allanite as an accessory mineral in medium buff-gray quartz monzonite granite, in a pinkish granite occurring beside a dike, and in a large inclusion of gneiss: 715.
Young quarry* 3/4 mi. SW of East Milford or Laurel post-office: allanite, possibly amounting to about 1% of the total estimated mineral percentage of the "dark-blue Westerly," a dark-gray quartz monzonite granite, of which allanite is an accessory mineral both in the granite and the small pegmatite dikes that cut it: 715; allanite as an accessory mineral in "dark-blue New Westerly" granite with limonite staining around the allanite: 716.

*1¼ mi. SE of Milford and

NEW HAMPSHIRE (contd.)

Merrimack County
Autunite Occurrences
Danbury
Danbury mine: beryl, traces of autunite, among rare and accessory minerals in pegmatite; geology, description: 690.
Radioactive Rocks
Central New England Province
Bradford, 3 mi. N of, on New Hampshire Highway 103: radioactivity of 100-ft. outcrop of pegmatite dikes in granite gneiss in area mapped as Precambrian or early Paleozoic schists, 0.010-0.015% eU: 842.
Uranium Occurrences
Danbury
Danbury mine: beryl, traces of autunite, among rare and accessory minerals in pegmatite; geology, description: 690.
Danbury mine at Danbury: small quantities of uranium minerals in pegmatite: 886.

Monazite Occurrences
See under individual county names and under Index III, Thorium Occurrences-New Hampshire: 104, 674, 726, 772, 996.

Parsonsite Occurrences
See under individual county names and under Index III, Parsonsite Occurrences-New Hampshire: 757.

Phosphuranylite Occurrences
See under individual county names and under Index III, Phosphuranylite Occurrences-New Hampshire: 757.

Prospectors' Guides
See under individual county names and under Index III, Prospectors' Guides-New Hampshire: 1101.

NEW HAMPSHIRE (contd.)

Radioactive Rocks

See under individual county names and under Index III, Radioactive Rocks-New Hampshire: 45, 674, 745, 746, 996, 1103.

Rockingham County

Autunite Occurrences

Smith (?) feldspar quarry in Raymond: autunite, gummite, uraninite, uranophane, among minerals in pegmatite: 1079.

Gummite Occurrences

Smith(?) feldspar quarry in Raymond: autunite, gummite, uraninite, uranophane, among minerals in pegmatite: 1079.

Thorium Occurrences

Smith(?) feldspar quarry in Raymond: autunite, gummite, uraninite, uranophane, among minerals present in pegmatite: 1079.

Uraninite Occurrences

Smith(?) feldspar quarry in Raymond: autunite, gummite, uraninite, uranophane, among minerals in pegmatite: 1079.

Uranium Occurrences

Blake mine at Raymond: small quantities of uranium minerals in pegmatite: 886.

Smith (?) feldspar quarry in Raymond: autunite, gummite, uraninite, uranophane, among minerals in pegmatite: 1079.

Uranophane Occurrences

Smith(?) feldspar quarry in Raymond: autunite, gummite, uraninite, uranophane, among minerals in pegmatite: 1079.

Samarskite Occurrences

See under individual county names and under Index III, Samarskite Occurrence-New Hampshire: 690, 886.

NEW HAMPSHIRE (contd.)

Southwest Part

Monazite Occurrences

Lovewell Mountain quadrangle

General: monazite among heavy minerals found in the Littleton formation in its Dakin Hill and Hubbard Hill members, and in the plutonic rocks of the area, namely, Bethlehem gneiss, Kinsman quartz monzonite, and an unnamed granodiorite; geology and mineralization of rocks of this area: 772.

Littleton formation: monazite content in weight percent of bulk sample was given as follows for the different members: Dakin Hill member, from high grade zone, in Lovewell Mountain quadrangle, 0.0 in biotite gneiss but 0.004 in pyritiferous gneiss: 772; monazite content of weight percent of bulk sample was given as follows for the different members: Hubbard Hill member, mica-quartz schist, from high-grade zone, Lovewell Mountain quadrangle, 0.002: 772; monazite content in weight percent of bulk sample was given as follows for the different members: mica schist, from middle grade zone, Keene area, 0.002: 772.

Plutonic rocks: monazite content in weight percent of bulk sample was given as follows: Bethlehem gneiss, 0.005: 772; monazite content in weight percent of bulk sample was given as follows: granodiorite from late dikes, 0.009: 772; monazite content in weight percent of bulk sample was given: Kinsman quartz monzonite, 0.02 at Bacon Ledge pluton and 0.002 in small pod in schist: 772.

NEW HAMPSHIRE (contd.)

Southwest Part (contd.)
Thorium Occurrences
Lovewell Mountain quadrangle
General: monazite among heavy minerals found in the Littleton formation in its Dakin Hill and Hubbard Hill members, and in the plutonic rocks of the area, namely, Bethlehem gneiss, Kinsman quartz monzonite, and an unnamed granodiorite; geology and mineralization of rocks of this area: 772.
Littleton formation: monazite content in weight percent of bulk sample was given as follows for the different members: Dakin Hill member, from high grade zone, in Lovewell Mountain quadrangle, 0.0 in biotite gneiss but 0.004 in pyritiferous gneiss: 772; monazite content in weight percent of bulk sample was given as follows for the different members: Hubbard Hill member, mica-quartz schist, from high-grade zone, Lovewell Mountain quadrangle, 0.002: 772; monazite content in weight percent of bulk sample was given as follows for the different members: mica schist, from middle grade zone, Keene area, 0.002: 772.
Plutonic rocks: monazite content in weight percent of bulk sample was given as follows: Bethlehem gneiss, 0.005: 772; monazite content in weight percent of bulk sample was given as follows: granodiorite from late dikes, 0.009: 772; monazite content in weight percent of bulk sample was given as follows: Kinsman quartz monzonite, 0.02 at Bacon Ledge pluton and 0.002 in small pod in schist: 772.

NEW HAMPSHIRE (contd.)

Strafford County
Autunite Occurrences
Center Strafford, 2 mi. NW of: autunite occurs as a low temperature hydrothermal mineral in small pale green flakes on the quartz, feldspar, or muscovite of a pegmatite lense enclosed in gneissic granite wall rock and forming part of a large granite body intruding schists and phyllites: 978.
Parker Mountain Mica Mine 2.3 mi. NW of Center Strafford: autunite, columbite, of mineralogical interest only: 859; autunite among rare and accessory minerals in pegmatite; geology, description: 690; autunite: 958.
Radioactive Rocks
Central New England Province
South Wolfeboro and Farmington, 6 mi. along unnumbered road between: radioactivity of fine-grained, light-buff granite of Conway granite, 0.003-0.005% eU: 842.
Uranium Occurrences
Center Strafford, 2 mi. NW of: autunite occurs as a low temperature hydrothermal mineral in small pale green flakes on the quartz, feldspar, or muscovite of a pegmatite lense enclosed in gneissic granite wall rock and forming part of a large granite body intruding schists and phyllites: 978.
Parker Mountain Mica Mine 2.3 mi. NW of Center Strafford: autunite, columbite, of mineralogical interest only: 859; autunite: 958; autunite among rare and accessory minerals in pegmatite; geology, description: 690.

NEW HAMPSHIRE (contd.)

Sullivan County
Allanite Occurrences
Sunapee
Sunapee quarry, operated by W. H. Perry Co.: allanite as an accessory mineral in the "dark Sunapee" or "black granite": 715.
Sunapee quadrangle
General: allanite in trace amounts as an accessory mineral in the Hubbard Hill member of the Littleton formation, in Bethlehem gneiss, in Kinsman quartz monzonite, and in the Spaulding quartz-diorite: 695.
Bethlehem gneiss: allanite in trace amounts as an accessory in quartz monzonite and granodiorite of the gneissic phase and in inclusions of medium- to fine-grained biotite gneiss and medium-grained pargasite-garnet gneiss: 695.
Chandler Hill: allanite in trace amounts in lime-silicate granulite of the Hubbard Hill member of the Littleton formation: 695.
Kinsman quartz monzonite: allanite in trace amounts as an accessory in the quartz diorite, the "sills" of medium-grained granodiorite and quartz diorite, and the feldspathized Littleton formation medium-grained biotite- or biotite-garnet gneiss: 695.
Spaulding quartz-diorite: allanite in trace amounts as an accessory in the Blueberry Mountain area: also in the adjacent quartz monzonite: 695.
Autunite Occurrences
Acworth: autunite, columbite in mica quarries; autunite here, of no commercial value but of mineralogical interest: 859.
Thorium Occurrences
Sunapee
Sunapee quarry, operated by W. H. Perry Co.: allanite as an accessory mineral in the "dark Sunapee" or "black granite": 715.

NEW HAMPSHIRE (contd.)

Sullivan County (contd.)
Thorium Occurrences
Sunapee Quadrangle
General: allanite in trace amounts as an accessory mineral in the Hubbard Hill member of the Littleton formation, in Bethlehem gneiss, in Kinsman quartz monzonite, and in the Spaulding quartz-diorite: 695.
Bethlehem gneiss: allanite in trace amounts as an accessory in quartz monzonite and granodiorite of the gneissic phase and in inclusions of medium- to fine-grained biotite gneiss and medium-grained pargasite-garnet gneiss: 695.
Chandler Hill: allanite in trace amounts in limesilicate granulite of the Hubbard Hill member of the Littleton formation: 695.
Kinsman quartz monzonite: allanite in trace amounts as an accessory in the quartz diorite, the "sills" of medium-grained granodiorite and quartz diorite, and the feldspathized Littleton formation medium-grained biotite- or biotite-garnet gneiss: 695.
Spaulding quartz-diorite: allanite in trace amounts as an accessory in the Blueberry Mountain area; also in the adjacent quartz monzonite: 695.
Uranium Occurrences
Acworth: autunite, columbite in mica quarries; autunite of no commercial value but of mineralogical interest: 859.

NEW HAMPSHIRE (contd.)

Sullivan County (contd.)

Uranium Occurrences

Acworth

Beryl locality: beryl embedded in smoky quartz which contains uranium as small yellow green cubical plates and as yellow powder, similar to deposits at Chesterfield, Massachusetts; yellow beryl may get its color from the uranium content: 980.

Beryl Mountain mine: small quantities of uranium minerals in pegmatite: 886.

Beryl Mountain quarry near South Acworth: beryl, a little uranium, columbite-tantalite, and small quantities of at least three other rare minerals being produced by Ashley Mining Co.: 930.

Smith mine at Chandler's Mills near Newport: some yellowish uranium minerals with brazilianite, etc: 937.

Thorium Occurrences

See under individual county names and under Index III, Thorium Occurrences-New Hampshire: 70, 104, 646, 647, 650, 651, 673, 674, 690, 694, 695, 696, 697, 699, 715, 716, 726, 727, 757, 772, 774, 830, 859, 860, 883, 886, 925, 943, 946, 948, 996, 1001, 1040, 1053, 1079, 1103.

Torbernite Occurrences

See under individual county names and under Index III, Torbernite Occurrences-New Hampshire: 647, 651, 690, 859, 1061.

Uraninite Occurrences

See under individual county names and under Index III, Uraninite Occurrences-New Hampshire: 70, 646, 647, 648, 650, 690, 694, 757, 774, 830, 859, 883, 925, 943, 946, 948, 958, 974, 996, 999, 1040, 1053, 1079.

NEW HAMPSHIRE (contd.)

Uranium Exploration

See under individual county names and under Index III, Uranium Exploration -New Hampshire: 1101.

Uranium Occurrences

See under individual county names and under Index III, Uranium Occurrences-New Hampshire: 70, 646, 647, 648, 650, 651, 658, 668, 674, 690, 694, 757, 774, 830, 835, 856, 857, 859, 883, 886, 895, 925, 930, 937, 943, 946, 948, 958, 963, 974, 978, 980, 996, 999, 1000, 1001, 1040, 1053, 1061, 1079, 1093, 1103.

Bibliography of U.S.G.S. Reports: 572, 1004.

Uranochalcite Occurrences

See under individual county names and under Index III, Uranochalcite Occurrences-New Hampshire: 668, 859.

Uranocircite Occurrences

See under individual county names and under Index III, Uranocircite Occurrences-New Hampshire: 958.

Uranophane Occurrences

See under individual county names and under Index III, Uranophane Occurrences-New Hampshire: 646, 647, 650, 651, 690, 859, 883, 958, 999, 1000, 1001, 1061, 1079.

Uranospinite Occurrences

See under individual county names and under Index III, Uranospinite Occurrences-New Hampshire: 958.

Xenotime Occurrences

See under individual county names and under Index III, Xenotime Occurrences-New Hampshire: 996.

NEW JERSEY

General

Allanite Occurrences

General: allanite deposits are known in Colorado, New Jersey, New York, North Carolina, Pennsylvania, Texas, Virginia, and Wyoming; while most of the deposits are of mineralogical interest only, commercial shipments have been made from Wyoming, Virginia, and possibly North Carolina: 1105.

Autunite Occurrences

Highlands of New Jersey: this belt is made up of granite gneiss, pegmatites, magnetite-biotite gneiss, and other hard crystalline rocks; both primary and secondary uranium mineralization have been found and the principal minerals noted to date are uraninite, pitchblende, autunite, torbernite, and carnotite(?); principal sources of uranium-bearing rocks have been the pegmatites, the magnetite-biotite rich rocks, and local disseminations in gneiss, with some uranium mineralization as fracture coatings: 1090.

Southwest Part: autunite and torbernite in small concentrations in arkosic redbeds of the Stockton formation (Triassic) in southwest New Jersey and adjacent Pennsylvania; abnormal radioactivity without visible uranium minerals is also reported; uraniferous material occurs in distinctly limonitic lenses of light gray sandstone and pyrite is moderately abundant in one radioactive outcrop in a stream bed; limonite at other occurrences probably represents weathered iron sulphides; Lockatong argillite conformably overlies the Stockton arkose and black carbonaceous zones in lacustrine facies are radioactive but tests showed them to be low grade and not likely to yield profitable extraction; outcrops of Triassic beds are scarce except for a narrow belt along the Delaware River and their importance as uranium carriers has not been ascertained: 1005.

NEW JERSEY (contd.)

General (contd.)

Carnotite Occurrences

Highlands of New Jersey: this belt is made up of granite gneiss, pegmatites, magnetite-biotite gneiss, and other hard crystalline rocks; both primary and secondary uranium mineralization have been found and the principal minerals noted to date are uraninite, pitchblende, autunite, torbernite, and carnotite(?); principal sources of uranium-bearing rocks have been the pegmatites, the magnetite-biotite rich rocks, and local disseminations in gneiss, with some uranium mineralization as fracture coatings: 1090.

Geochemical Exploration

General: two new geochemical methods depending on the high solubility of radon gas in water over a wide range of pH values and on the diffusion of radon gas through residual soil and other types of overburden were developed by John Harley in the U.S.A.E.C. Health and Safety Laboratory in New York and are being tested in the field in the Triassic lowlands of New Jersey, where rock outcrops are virtually absent and numerous wells provide adequate sample spacing: 1005.

Geophysical Exploration (Airborne)

General: airborne radiometric survey for uranium ore in northern New Jersey and adjacent southeastern New York area by Safair Flying Service of Teterboro, New Jersey; ground reconnaissance combined with air operations: 1086.

Iron Deposits, Thorium-bearing

General: magnetite deposits in crystalline belt of New Jersey contain small concentrations of uraninite: 1103;

NEW JERSEY (contd.)

General (contd.)

Iron Deposits, Thorium-bearing

General:

several interesting occurrences in Precambrian granitic gneiss of New Jersey and New York are associated with magnetite-rich rocks; two of particular interest were: uraninite along contact of a footwall gneiss and magnetite ore, but uranium is known only in pockets one to two ft. in diameter scattered at random along zones parallel to gneissic foliation and its distribution is unrelated to folds, faults, and shears in the gneiss indicating than the association with magnetite and ferromagnesian gneiss is a better ore guide in this occurrence than the structure: 1005; several interesting occurrences in Precambrian granitic gneiss of New Jersey and New York are associated with magnetite-rich rocks; two of particular interest were: uranothorite in an extensive footwall zone of a magnetite orebody, the uraniferous zone being stained red by hematite as were the borders of associated radioactive fractures; such

hematite staining is a prominent feature of many large uranium vein deposits, especially in the Precambrian shield area of western Canada: 1005.

Iron Deposits, Uranium-bearing

General: magnetite deposits in crystalline belt of New Jersey contain small concentrations of uraninite: 1103; several interesting uranium occurrences in Precambrian granitic gneiss of New Jersey and New York are associated with magnetite-rich rocks; three of particular interest were: uraninite along contact of a footwall gneiss and magnetite ore, but uranium is known only in pockets one to two ft. in diameter scattered at random along zones

NEW JERSEY (contd.)

General (contd.)

Iron Deposits, Uranium-bearing

General:

parallel to gneissic foliation and its distribution is unrelated to folds, faults, and shears in the gneiss indicating that the association with magnetite and ferromagnesian gneiss is a better ore guide in this occurrence than the structure: 1005; several interesting uranium occurrences in Precambrian granitic gneiss of New Jersey and New York are associated with magnetite-rich rocks; three of particular interest were: uranothorite in an extensive footwall zone of a magnetite orebody, the uraniferous zone being stained red by hematite as were the borders of associated radioactive fractures; such hematite staining is a prominent feature of many large uranium vein deposits, especially in the Precambrian shield area of western Canada: 1005; several interesting uranium occurrences in Precambrian granitic gneiss of New Jersey and New York are associated with magnetite-rich rocks; three of particular interest were: uranium confined to chlorite-hornblende-magnetite rich layers in tightly folded and drag-folded schistose gneiss bordering the magnetite ore; uranium concentrations are localized along the axial parts of these folds forming pencil-like shoots several feet across, of good grade, and parallel to the regional plunge: 1005.

Iron mines: primary uranium minerals: 883.

NEW JERSEY (contd.)

General (contd.)

Iron Deposits, Uranium-bearing

Southwest Part: autunite and torbernite in small concentrations in arkosic redbeds of the Stockton formation (Triassic) in southwest New Jersey and adjacent Pennsylvania; abnormal radioactivity without visible uranium minerals is also reported; uraniferous material occurs in distinctly limonitic lenses of light gray sandstone and pyrite is moderately abundant in one radioactive outcrop in a stream bed; limonite at other occurrences probably represents weathered iron sulphides; Lockatong argillite conformably overlies the Stockton arkose and black carbonaceous zones in lacustrine facies are radioactive but tests showed them to be low grade and not likely to yield profitable extraction; outcrops of Triassic beds are scarce except for a narrow belt along the Delaware River and their importance as uranium carriers has not been ascertained: 1005.

Limestones, Uranium-bearing

General: uranium in limestone: 27; uranium in limestone in northwest part of state: 426.

Pitchblende Occurrences

Highlands of New Jersey: this belt is made up of granite gneiss, pegmatites, magnetite-biotite gneiss, and other hard crystalline rocks; both primary and secondary uranium mineralization have been found and the principal minerals noted to date are uraninite, pitchblende, autunite, torbernite, and carnotite(?); principal sources of uranium-bearing rocks have been the pegmatites, the magnetite-biotite rich rocks, and local disseminations in gneiss, with some uranium mineralization as fracture coatings: 1090.

Prospectors' Guides

Exploration methods: 1090, 1101.

Mining laws: 1090, 1101.

NEW JERSEY (contd.)

General (contd.)

Prospectors' Guides

Mining Methods: 1090.

Regulations regarding prospecting for uranium on state-owned lands: 1090.

Uranium: 1090, 1101.

Radioactive Carbonaceous Deposits

Southwest Part: autunite and torbernite in small concentrations arkosic redbeds of the Stockton formation(Triassic) in southwest New Jersey and adjacent Pennsylvania; abnormal radioactivity without visible uranium minerals is also reported; uraniferous material occurs in distinctly limonitic lenses of light gray sandstone and pyrite is moderately abundant in one radioactive outcrop in a stream bed; limonite at other occurrences probably represents weathered iron sulphides; Lockatong argillite conformably overlies the Stockton arkose and black carbonaceous zones in lacustrine facies are radioactive but tests showed them to be low grade and not likely to yield profitable extraction; outcrops of Triassic beds are scarce except for a narrow belt along the Delaware River and their importance as uranium carriers has not been ascertained: 1005.

Radioactive Occurrences

General: studies made of 16 copper deposits in Triassic Newark group and of several iron deposits rich in apatite and zircon but none was significantly radioactive; in general the Cu deposits have a very low radioactivity: 994.

Bibliography: includes a few papers on radioactive occurrences: 767.

NEW JERSEY (contd.)

General (contd.)
Radioactive Rocks
General: the Clinton formation of Silurian age was examined radiometrically by U.S.G.S. geologists at 31 localities in Maryland, New Jersey, New York, and Pennsylvania, with particular attention to the phosphatic and hematitic parts of the formation; none of the places tested showed abnormal radioactivity, or suggested a concentration of radioactive elements in excess of 0.004% eU, which was also the maximum radioactivity of samples tested; no sample contained more than 0.001% U; no further work planned by U.S.G.S.: 935.
Watchung Mountains: helium and radioactivity data for basalt flow, 0.82 x 10^{-5}cc.He/g. and 0.37 alphas/mg./hr.: 798.
Thorium Occurrences
General: allanite deposits are known in Colorado, New Jersey, New York, North Carolina, Pennsylvania, Texas, Virginia, and Wyoming; while most of the deposits are of mineralogical interest only, commercial shipments have been made from Wyoming, Virginia, and possibly North Carolina: 1105; magnetite deposits in crystalline belt of New Jersey contain small concentrations of uraninite: 1103; several interesting occurrences in Precambrian granitic gneiss of New Jersey and New York are associated with magnetite-rich rocks; two of particular interest were: uraninite along contact of a footwall gneiss and magnetite ore, but uranium is known only in pockets one to two ft. in diameter scattered at random along zones parallel to gneissic foliation and its distribution is unrelated to folds, faults, and shears in the gneiss indicating that the association with magnetite and ferromagnesian gneiss is a better ore guide in this occurrence than the structure: 1005;

NEW JERSEY (contd.)

General (contd.)
Thorium Occurrences
General:
several interesting occurrences in Precambrian granitic gneiss of New Jersey and New York are associated with magnetite-rich rocks; two of particular interest were: uranothorite in an extensive footwall zone of a magnetite orebody, the uraniferous zone being stained red by hematite as were the borders of associated radioactive fractures; such hematite staining is a prominent feature of many large uranium vein deposits, especially in the Precambrian shield area of western Canada: 1005.
Bibliography: includes a few papers on radioactive occurrences: 767.
Highlands of New Jersey: this belt is made up of granite gneiss, pegmatites, magnetite-biotite gneiss, and other hard crystalline rocks; both primary and secondary uranium mineralization have been found and the principal minerals noted to date are uraninite, pitchblende, autunite, torbernite, and carnotite (?); principal sources of uranium-bearing rocks have been the pegmatites, the magnetite-biotite rich rocks, and local disseminations in gneiss, with some uranium mineralization as fracture coatings: 1090.
Iron Deposits, Thorium-bearing
General: magnetite deposits in crystalline belt of New Jersey contain small concentrations of uraninite: 1103; several interesting occurrences in Precambrian granitic gneiss of New Jersey and New York are associated with magnetite-rich rocks; two of particular interest were: uraninite along

NEW JERSEY (contd.)

General (contd.)
Thorium Occurrences
Iron Deposits, Thorium-bearing
General:
contact of a footwall gneiss and magnetite ore, but uranium is known only in pockets one to two ft. in diameter scattered at random along zones parallel to gneissic foliation and its distribution is unrelated to folds, faults, and shears in the gneiss indicating that the association with magnetite and ferromagnesian gneiss is a better ore guide in this occurrence than the structure: 1005; several interesting occurrences in Precambrian granitic gneiss of New Jersey and New York are associated with magnetite-rich rocks; two of particular interest were: uranothorite in an extensive footwall zone of a magnetite orebody, the uraniferous zone being stained red by hematite as were the borders of associated radioactive fractures; such hematite staining is a prominent feature of many large uranium vein deposits, especially in the Precambrian shield area of western Canada: 1005.

Torbernite Occurrences
Highlands of New Jersey: this belt is made up of granite gneiss, pegmatites, magnetite-biotite gneiss, and other hard crystalline rocks; both primary and secondary uranium mineralization have been found and the principal minerals noted to date are uraninite, pitchblende, autunite, torbernite, and carnotite (?); principal sources of uranium-bearing rocks have been the pegmatites, the magnetite-biotite rich rocks, and local disseminations in gneiss, with some uranium mineralization as fracture coatings: 1090.

NEW JERSEY (contd.)

General (contd.)
Torbernite Occurrences
Southwest Part: autunite and torbernite in small concentrations in arkosic redbeds of the Stockton formation (Triassic) in southwest New Jersey and adjacent Pennsylvania; abnormal radioactivity without visible uranium minerals is also reported; uraniferous material occurs in distinctly limonitic lenses of light gray sandstone and pyrite is moderately abundant in one radioactive outcrop in a stream bed; limonite at other occurrences probably represents weathered iron sulphides; Lockatong argillite conformably overlies the Stockton arkose and black carbonaceous zones in lacustrine facies are radioactive but tests showed them to be low grade and not likely to yield profitable extraction; outcrops of Triassic beds are scarce except for a narrow belt along the Delaware River and their importance as uranium carriers has not been ascertained: 1005.

Uraninite Occurrences
General: magnetite deposits in crystalline belt of New Jersey contain small concentrations of uraninite: 1103; several interesting uranium occurrences in Precambrian granitic gneiss of New Jersey and New York are associated with magnetite-rich rocks; one of particular interest was: uraninite along contact of a footwall gneiss and magnetite ore, but uranium is known only in pockets one to two ft. in diameter scattered at random along zones parallel to gneissic foliation and its distributions is unrelated to folds, faults and shears in the gneiss indicating that the association

NEW JERSEY (contd.)

General (contd.)
Uraninite Occurrences
General:
with magnetite and ferromagnesian gneiss is a better ore guide in this occurrence than the structure: 1005.
Highlands of New Jersey: this belt is made up of granite gneiss, pegmatites, magnetite-biotite gneiss, and other hard crystalline rocks; both primary and secondary uranium mineralization have been found and the principal minerals noted to date are uraninite pitchblende, autunite, torbernite, and carnotite(?); principal sources of uranium-bearing rocks have been the pegmatites, the magnetite-biotite rich rocks, and local disseminations in gneiss, with some uranium mineralization as fracture coatings: 1090.
Uranium Exploration
General: airborne radiometric survey for uranium ore in northern New Jersey and adjacent southeastern New York area by Safair Flying Service of Teterboro, New Jersey; ground reconnaissance combined with air operations: 1086.
Methods: 1090, 1101.
Mining laws: 1090, 1101.
Mining methods: 1090.
Prospectors' guide: 1090, 1101.
Regulations regarding prospecting for uranium on state-owned lands: 1090.
Geochemical Exploration
General: two new geochemical methods depending on the high solubility of radon gas in water over a wide range of pH values and on the diffusion of radon gas through residual soil and other types of overburden, were developed by John Harley in the U.S.A.E.C. Health and Safety Laboratory in New York and are being tested in the field in the Triassic lowlands of New Jersey, where rock outcrops are virtually absent and numerous wells provide adequate sample spacing: 1005.

NEW JERSEY (contd.)

General (contd.)
Uranium Exploration
Geophysical Exploration (Airborne)
General: airborne radiometric survey for uranium ore in northern New Jersey and adjacent southeastern New York area by Safair Flying Service of Teterboro, New Jersey; ground reconnaissance combined with air operations: 1086.
Uranium Occurrences
General: commercial deposits of uraninite or other primary minerals may be found in the crystalline rocks of eastern New York or in or near iron and other mineral deposits in New Jersey and New York: 883; magnetite deposits in crystalline belt of New Jersey contain small concentrations of uraninite: 1103; several interesting uranium occurrences in Precambrian granitic gneiss of New Jersey and New York are associated with magnetite-rich rocks; three of particular interest were: uraninite along contact of a footwall gneiss and magnetite ore, but uranium is known only in pockets one to two ft. in diameter scattered at random along zones parallel to gneissic foliation and its distribution is unrelated to folds, faults, and shears in the gneiss indicating that the association with magnetite and ferromagnesian gneiss is a better ore guide in this occurrence than the structure: 1005; several interesting uranium occurrences in Precambrian granitic gneiss of New Jersey and New York are associated with magnetite-rich rocks; three of particular interest were: uranothorite in an extensive footwall zone

NEW JERSEY (contd.)

General (contd.)
Uranium Occurrences
General:
of a magnetite orebody, the uraniferous zone being stained red by hematite as were the borders of associated radioactive fractures; such hematite staining is a prominent feature of many large uranium vein deposits, especially in the Precambrian shield area of western Canada: 1005; several interesting uranium occurrences in Precambrian granitic gneiss of New Jersey and New York are associated with magnetite-rich rocks; three of particular interest were: uranium confined to chlorite-hornblende-magnetite rich layers in tightly folded and drag-folded schistose gneiss bordering the magnetite ore; uranium concentrations are localized along the axial parts of these folds forming pencil-like shoots several feet across, of good grade, and parallel to the regional plunge: 1005; potential sources of new deposits of uranium may be found in the folded conglomerates and sandstones of the long ridges and valleys in eastern Pennsylvania and western New Jersey, and in similar formations farther south, because of the presence of such deposits at Jim Thorpe (formerly Mauch Chunk), Pennsylvania, and the more recent finds in Bucks County, Pennsylvania, and Hunterdon and Mercer Counties, New Jersey: 883; other potential sources of uranium which should be investigated include iron deposits, where primary uranium minerals may be masked with coatings of limonite and hematite, Triassic sandstones, Kittatinny limestone, and crystalline rocks of the Highlands, since some radioactivity has been found already in such formations: 1090;

NEW JERSEY (contd.)

General (contd.)
Uranium Occurrences
General:
relatively high level of radioactivity in southeastern Pennsylvania and western New Jersey as compared with other areas in northeastern states and the presence of uranium minerals both at Stockton, New Jersey, and Easton, Pennsylvania, suggests that this area of the Piedmont belt and flanking sediments merit additional study as potential sources of uranium and thorium minerals; work to be undertaken by U.S. G.S.: 973; uranium in limestone in northwest part of state: 426; uranium-bearing limestone: 27.

Appalachian region: one of the most promising and least prospected areas in the United States since the Appalachians extend from Alabama and Georgia to Quebec and uranium minerals have been found in Alabama, Kentucky, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Tennessee, and Vermont: 1093; some of the best uranium possibilities seem to lie in the long valleys of western New Jersey and eastern Pennsylvania, and in the plateaus of Alabama, northern Kentucky, and Ohio: 1093.

Bibliography: includes a few papers on radioactive occurrences: 767.

Bibliography of U.S.G.S. Reports: 572, 1004.

NEW JERSEY (contd.)

General (contd.)
Uranium Occurrences
Highlands of New Jersey: this belt is made up of granite gneiss, pegmatites, magnetite-biotite gneiss, and other hard crystalline rocks; both primary and secondary uranium mineralization have been found and the principal minerals noted to date are uraninite, pitchblende, autunite, torbernite, and carnotite(?); principal sources of uranium-bearing rocks have been the pegmatites, the magnetite-biotite rich rocks, and local disseminations in gneiss, with some uranium mineralization as fracture coatings: 1090.
Iron mines: primary uranium minerals present: 883.
Southwest Part: autunite and torbernite in small concentrations in arkosic redbeds of the Stockton formation (Triassic) in southwest New Jersey and adjacent Pennsylvania; abnormal radioactivity without visible uranium minerals is also reported; uraniferous material occurs in distinctly limonitic lenses of light gray sandstone and pyrite is moderately abundant in one radioactive outcrop in a stream bed; limonite at other occurrences probably represents weathered iron sulphides; Lockatong argillite conformably overlies the Stockton arkose and black carbonaceous zones in lacustrine facies are radioactive but tests showed them to be low grade and not likely to yield profitable extraction; outcrops of Triassic beds are scarce except for a narrow belt along the Delaware River and their importance as uranium carriers has not been ascertained: 1005.
Types: hydrothermal vein deposits: 62.
Iron Deposits, Uranium-bearing
General: magnetite deposits in crystalline belt of New Jersey contain small concentrations of uraninite: 1103;

NEW JERSEY (contd.)

General (contd.)
Uranium Occurrences
Iron Deposits, Uranium-bearing
General: several interesting uranium occurrences in Precambrian granitic gneiss of New Jersey and New York are associated with magnetite-rich rocks; three of particular interest were: uraninite along contact of a footwall gneiss and magnetite ore, but uranium is known only in pockets one to two ft. in diameter scattered at random along zones parallel to gneissic foliation and its distribution is unrelated to folds, faults, and shears in the gneiss indicating that the association with magnetite and ferromagnesian gneiss is a better ore guide in this occurrence than the structure: 1005; several interesting uranium occurrences in Precambrian granitic gneiss of New Jersey and New York are associated with magnetite-rich rocks; three of particular interest were: uranothorite in an extensive footwall zone of a magnetite orebody, the uraniferous zone being stained red by hematite as were the borders of associated radioactive fractures; such hematite staining is a prominent feature of many large uranium vein deposits, especially in the Precambrian shield area of western Canada: 1005; several interesting uranium occurrences in Precambrian granitic gneiss of New Jersey and New York are associated with magnetite-rich rocks; three of particular interest were: uranium confined to chlorite-hornblende-magnetite rich layers in

NEW JERSEY (contd.)

General (contd.)

Iron Deposits, Uranium-bearing

General:

tightly folded and drag-folded schistose gneiss bordering the magnetite ore; uranium concentrations are localized along the axial parts of these folds forming pencil-like shoots several feet across, of good grade, and parallel to the regional plunge: 1005.

Iron mines: primary uranium minerals: 883.

Uranothorite Occurrences

General: several interesting occurrences in Precambrian granitic gneiss of New Jersey and New York are associated with magnetite-rich rocks; one of particular interest was: uranothorite in an extensive footwall zone of a magnetite orebody, the uraniferous zone being stained red by hematite as were the borders of associated radioactive fractures; such hematite staining is a prominent feature of many large uranium vein deposits, especially in the Precambrian shield area of western Canada: 1005.

Allanite Occurrences

See under individual county names and under Index III, Thorium Occurrences-New Jersey: 249, 660, 691, 700, 734, 789, 808, 810, 846, 866, 876, 890, 922, 961, 969, 997, 1041, 1043, 1056, 1062, 1105.

Apatite, Thorium-bearing

See under individual county names and under Index III, Apatite, Thorium-bearing-New Jersey: 843.

Apatite, Uranium-bearing

See under individual county names and under Index III, Apatite, Uranium-bearing-New Jersey: 843.

NEW JERSEY (contd.)

Argillite, Uranium-bearing

See under individual county names and under Index III, Argillite, Uranium-bearing - New Jersey: 995, 996.

Atlantic County

Beach Sands, Thorium-bearing

Brigantine, Roosevelt Avenue at high tide line: Sample 0-7, traces of monazite in beach sand of 0.074 mm. size: 844.

Monazite Occurrences

Brigantine, Roosevelt Avenue at high tide line: Sample 0-7, traces of monazite in beach sand of 0.074 mm. size: 844.

Thorium Occurrences

Brigantine, Roosevelt Avenue at high tide line: Sample 0-7, traces of monazite in beach sand of 0.074 mm. size: 844.

Atlantic and Ocean Counties

Beach Sands, Thorium-bearing

Little Egg Inlet: monazite in sea bottom samples of sand in Sample B-51 as traces in 0.210 mm. size, in Sample B-64 as traces in 0.105 and 0.149 mm. sizes, in Sample B-71 as traces in 0.074 mm. size, and in Sample B-73 as 1% content in 0.149 mm. size: 844.

Monazite Occurrences

Little Egg Inlet: monazite in sea bottom samples of sand in Sample B-51 as traces in 0.210 mm. size, in Sample B-64 as traces in 0.105 and 0.149 mm. sizes, in Sample B-71 as traces in 0.074 mm. size, and in Sample B-73 as 1% content in 0.149 mm. size: 844.

NEW JERSEY (contd.)

Atlantic and Ocean Counties (contd.)

Thorium Occurrences

Little Egg Inlet: monazite in sea bottom samples of sand in Sample B-51 as traces in 0.210 mm. size, in Sample B-64 as traces in 0.105 and 0.149 mm. sizes, in Sample B-71 as traces in 0.074 mm. size, and in Sample B-73 as 1% content in 0.149 mm. size: 844.

Autunite Occurrences

See under individual county names and under Index III, Autunite Occurrences-New Jersey: 846, 1005, 1073, 1090.

Bastnaesite Occurrences

See under individual county names and under Index III, Bastnaesite Occurrences- New Jersey: 1113.

Beach Sands, Thorium-bearing

See under individual county names and under Index III, Beach Sands, Thorium-bearing-New Jersey: 844.

Bergen County

Carnotite Occurrences

Palisades diabase sill, about 1 mi. N of the George Washington Bridge: yellow fluorescent mineral, believed to be carnotite, with hyalite as patches on joint planes of an arkose: 688; origin of both carnotite and hyalite, probably occurred during the period of hot water circulation following the intrusion with the carnotite antedating the hyalite: 688.

Radioactive Rocks

Edgewater: Palisade diabase, 70 ft. below surface in road cut, activity 1.02×10^{-5}cc. He/g., 0.14×10^{-12}g. Ra/g., 2.08×10^{-6}g. Th/g., and age ratio 92 m.y.: 786.

Edgewater on New Jersey Highway 5, 70 ft. below top of Palisades bluff:

1. Palisade diabase, radioactivity $0.15 \pm 0.01 \times 10^{-12}$g. Ra/g. rock: 745;
2. average U and Th content found from average activity of 5 samples, 4 from New Jersey and 1

NEW JERSEY (contd.)

Bergen County (contd.)

Radioactive Rocks

Edgewater on New Jersey Highway 5, 70 ft. below top of Palisades bluff:

from New York, $0.54 \pm 0.05 \times 10^{-6}$g. U/g. rock, $2.2 \pm 0.3 \times 10^{-6}$g. Th/g. rock, and Th/U ratio 4.0: 745.

Thorium Occurrences

Edgewater: Palisade diabase, 70 ft. below surface in road cut, activity 1.02×10^{-5}cc. He/g., 0.14×10^{-12}g. Ra/g., 2.08×10^{-6}g. Th/g., and age ratio 92 m.y.: 786.

Edgewater on New Jersey Highway 5, 70 ft. below top of Palisades bluff:

1. Palisade diabase, radioactivity $0.15 \pm 0.01 \times 10^{-12}$ g. Ra/g. rock: 745;
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Uranium Occurrences

Edgewater on New Jersey Highway 5, 70 ft. below top of Palisades bluff:

1. Palisade diabase, radioactivity $0.15 \pm 0.01 \times 10^{-12}$ g. Ra/g. rock: 745;
2. average U and Th content found from average activity of 5 samples, 4 from New Jersey and 1 from New York, $0.54 \pm 0.05 \times 10^{-6}$g. U/g. rock, $2.2 \pm 0.3 \times 10^{-6}$g. Th/g. rock, and Th/U ratio 4.0: 745.

Palisades diabase sill, about 1 mi. N of the George Washington Bridge: yellow fluorescent mineral, believed to be carnotite, with hyalite as patches on joint planes of an arkose: 688;

NEW JERSEY (contd.)

Bergen County (contd.)

Uranium Occurrences

Palisades diabase sill, about 1 mi. N of the George Washington Bridge: origin of both carnotite and hyalite, probably occurred during the period of hot water circulation following the intrusion with the carnotite antedating the hyalite: 688.

Bibliographies

Radioactive Occurrences

Bibliography: includes a few papers on radioactive occurrences: 767.

Thorium Occurrences

Bibliography: includes a few papers on radioactive occurrences: 767.

Uranium Occurrences

Bibliography: includes a few papers on radioactive occurrences: 767.

Bibliography of U.S.G.S. Reports: 572, 1004.

Burlington County

Radioactive Occurrences

Birmingham marl pit at Birmingham, 4 mi. ESE of Mount Holly: radioactivity of black to blue-black glauconitic sands of Hornerstown formation, 0.04 mr/hr; radioactivity of two channel samples from NE part of pit, 0.003 and 0.004% eU, and of grab sample from stockpile near road, 0.004% eU: 843.

Marlton roadcut, 5 mi. E of Medford: no radioactivity reported for reworked greensand marl but a sample gave 0.002% eU: 843.

Reeves Station marl pit, 2 mi. N of Medford: radioactivity of 0.04 mr/hr reported for black to green glauconitic sands of Hornerstown formation with "iron stone" full of shell casts; radioactivity of a number of samples gave 0.005% eU for dried greensand fine and coarse rejects from screen and 0.004% eU for other sands, zeolite products, and waste fines and excess chemicals: 843.

NEW JERSEY (contd.)

Cape May County

Beach Sands, Thorium-bearing

Cape May: Sample B-83 had 1% monazite in sea bottom samples of sand in 0.149 mm. size: 844.

Higbee Beach: Sample S-19, traces of monazite in source samples from part of Cape May formation on beach in sands of 0.149 and 0.210 mm. size: 844.

Sea Isle City, 0.9 mi. N of Ludlam Beach Light: Sample 107, traces of monazite in beach sand of 0.149 mm. size: 844.

Wildwood at Magnolia Avenue: Sample 122, traces of monazite in beach sand of 0.210 mm. size: 844.

Monazite Occurrences

Cape May: Sample B-83 had 1% monazite in sea bottom samples of sand in 0.149 mm. size: 844.

Higbee Beach: Sample S-19, traces of monazite in source samples from part of Cape May formation on beach in sands of 0.149 and 0.210 mm. size: 844.

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Wildwood at Magnolia Avenue: Sample 122, traces of monazite in beach sand of 0.210 mm. size: 844.

Thorium Occurrences

Cape May: Sample B-83 had 1% monazite in sea bottom samples of sand in 0.149 mm. size: 844.

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Wildwood at Magnolia Avenue: Sample 122, traces of monazite in beach sand of 0.210 mm. size: 844.

NEW JERSEY (contd.)

Carnotite Occurrences
See under individual county names and under Index III, Carnotite Occurrences-New Jersey: 688, 1090.

Clays, Uranium-bearing
See under individual county names and under Index III, Clays, Uranium-bearing-New Jersey: 995.

Dolomite, Uranium-bearing
See under individual county names and under Index III, Dolomite, Uranium-bearing-New Jersey: 995.

Essex County
Radioactive Rocks
Livingston: Second Watchung basalt, 5 ft. below surface in road cut, activity 0.67 x 10^{-5}cc. He/g.: 786.
Riker Hill: Third Watchung basalt, 4 ft. below surface in road cut, activity 0.74 x 10^{-5}cc. He/g: 786.

Geochemical Exploration
See under individual county names and under Index III, Geochemical Exploration-New Jersey: 1005.

Geophysical Exploration (Airborne)
See under individual county names and under Index III, Geophysical Exploration (Airborne)-New Jersey: 1086.

Gummite Occurrences
See under individual county names and under Index III, Gummite Occurrences-New Jersey: 660, 708.

Hudson County
Radioactive Rocks
Guttenberg from old quarry on River Road facing Hudson River:
1. Palisade diabase, radioactivity 0.19 ± 0.01 x 10^{-12}g. Ra/g. rock: 745;
2. average U and Th content found from average activity of 5 samples, 4 from New Jersey and 1 from New York, 0.54 ± 0.05 x 10^{-6} gU/g. rock, 2.2 ± 0.3 x 10^{-6}g. Th/g. rock, and Th/U ratio 4.0: 745.

NEW JERSEY (contd.)

Hudson County (contd.)
Radioactive Rocks
Guttenberg at River Road: Palisade diabase, 150 ft. below surface in quarry, activity 0.93 x 10^{-5}cc. He/g., 0.16 x 10^{-12}g. Ra/g., 2.34 x 10^{-6}g. Th/g., and age ratio 75 m.y.: 786.
North Bergen from corner of River Road and 16th Street:
1. Palisade diabase, radioactivity 0.19 ± 0.01 x 10^{-12}g. Ra/g. rock: 745;
2. average U and Th content found from average activity of 5 samples, 4 from New Jersey and 1 from New York, 0.54 ± 0.05 x 10^{-6} gU/g. rock, 2.2 ± 0.3 x 10^{-6}g. Th/g. rock, and Th/U ratio 4.0: 745.
North Bergen at River Road: Palisade diabase, 20 ft. below surface in road cut, activity 0.96 x 10^{-5}cc. He/g., 0.19 x 10^{-12}g. Ra/g., 2.37 x 10^{-6}g. Th/g., and age ratio 72 m.y.: 786.
Thorium Occurrences
Guttenberg from old quarry on River Road facing Hudson River:
1. Palisade diabase, radioactivity 0.19 ± 0.01 x 10^{-12}g. Ra/g. rock: 745;
2. average U and Th content found from average activity of 5 samples, 4 from New Jersey and 1 from New York, 0.54 ± 0.05 x 10^{-6}g. U/g. rock, 2.2 ± 0.3 x 10^{-6}g. Th/g. rock, and Th/U ratio 4.0: 745.
Guttenberg at River Road: Palisade diabase, 150 ft. below surface in quarry, activity 0.93 x 10^{-5}cc. He/g., 0.16 x 10^{-12}g. Ra/g., 2.34 x 10^{-6}g. Th/g., and age ratio 75 m.y.: 786.

NEW JERSEY (contd.)

Hudson County (contd.)

Thorium Occurrences

North Bergen from corner of River Road and 16 Street:

1. Palisade diabase, radioactivity 0.19 ± 0.01 x 10^{-12} g. Ra/g. rock: 745;
2. average U and Th content found from average activity of 5 samples, 4 from New Jersey and 1 from New York, 0.54 ± 0.05 x 10^{-6}g. U/g. rock, 2.2 ± 0.3 x 10^{-6}g. Th/g. rock, and Th/U ratio 4.0: 745.

North Bergen at River Road: Palisade diabase, 20 ft. below surface in road cut, activity 0.96 x 10^{-5}cc. He/g., 0.19 x 10^{-12}g. Ra/g., 2.37 x 10^{-6}g Th/g., and age ratio 72 m.y.: 786.

Uranium Occurrences

Guttenberg from old quarry on River Road facing Hudson River:

1. Palisade diabase, radioactivity 0.19 ± 0.01 x 10^{-12}g. Ra/g. rock: 745;
2. average U and Th content found from average activity of 5 samples, 4 from New Jersey and 1 from New York, 0.54 ± 0.05 x 10^{-6}g. U/g. rock, 2.2 ± 0.3 x 10^{-6}g. Th/g. rock, and Th/U ratio 4.0: 745.

North Bergen from corner of River Road and 16 Street:

1. Palisade diabase, radioactivity 0.19 ± 0.01 x 10^{-12}g. Ra/g. rock: 745;
2. average U and Th content found from average activity of 5 samples, 4 from New Jersey and 1 from New York, 0.54 ± 0.05 x 10^{-6}g. U/g. rock, 2.2 ± 0.3 x 10^{-6}g. Th/g. rock, and Th/U ratio 4.0: 745.

NEW JERSEY (contd.)

Hunterdon County

Apatite, Uranium-bearing

Mulligan quarry on W bank of Raritan River at Clinton: quarry in Kittatinny limestone; at S end 15-foot shear zone strikes N 25° E and dips about 85° NW and can be traced for 500 ft.; shear zone shows varying degrees of radioactivity, which in general decreases to the southwest; sample from most shear part assayed 0.008% eU but is not representative, assay is too low; Geiger counter measurements at outcrop show that a different sample of uraniferous limestone, presumably from this zone and submitted to U.S.G.S., assayed 0.068% U; a yellowish-tan earthy material from shear zone, identified as apatite by X-ray, showed presence of U in fluorescent bead tests; north end of quarry, 500 ft. N of shear zone, has most radioactive part of the limestone; a 4-inch layer of black limestone here, conformable to bedding, measured 0.7 mr/hr. and a sample assayed 0.046% U; part of a vertical joint surface, 5 ft. below black layer, is coated with an unidentified radioactive yellowish green mineral, of which a sample assayed 0.007% U; economic possibilities probably could be determined by diamond drilling one or two core holes in shear zone since surface anomalies may reflect greater concentrations of U at depth: 843.

Pasture 1500 ft. NW of Mulligan quarry: areas as much as 100 ft. square measure from 0.05 to 0.20 mr/hr. but there is no outcrop at these places; although they are not on the strike with shear zone in the quarry, the inference is made that similar radioactive shear zones may exist beneath the soil; since U compounds leach readily and U is easily transported, anomalies detected on surface may possibly

NEW JERSEY (contd.)

Hunterdon County (contd.)

Apatite, Uranium-bearing

Pasture 1500 ft. NW of Mulligan quarry: reflect greater U concentrations at depth; economic possibilities probably could be determined from information found by bulldozing a trench 100 ft. long and 4 ft. deep in pasture: 843.

Argillite, Uranium-bearing

General: ten occurrences of uranium-bearing argillite in the Lockatong formation and three occurrences of uranium-bearing sandstone in the Stockton formation, both of Triassic age, in Bucks County, Pennsylvania, and in Hunterdon County, New Jersey; argillite contains as much as 0.05% U but usually from 0.01 to 0.02% U while sandstone samples, on which assays were incomplete, were estimated to range from 0.02 to 0.05% U; uranium-bearing sandstone occurrences are small usually less than 50 ft. long and 1-2 ft. thick, the largest being discontinuously radioactive along a strike length of 250 ft.; sandstone is medium to fine-grained, arkosic, and commonly mixed with clay pebbles where U content is greatest; none of the known occurrences of either uranium-bearing argillite or sandstone is economically significant: 995; assays of samples from Hunterdon County, New Jersey, and Bucks County, Pennsylvania, show that the radioactive argillite in the Lockatong formation of Triassic age usually contains from 0.005 to 0.01% U and the sandstone in the Stockton formation of the same age contains from 0.01 to 0.03% U; comparison of the lithologic and mineralogic characteristics of these occurrences with similar ones in other parts of the world suggests that neither the Lockatong nor the Stockton formation

NEW JERSEY (contd.)

Hunterdon County (contd.)

Argillite, Uranium-bearing

General: is likely to contain high-grade U deposits: 996.

Autunite Occurrences

Stockton: autunite and torbernite in small concentrations in arkosic redbeds of the Stockton formation (Triassic): 1005.

Stockton in road band near Delaware River: small crystals of torbernite, a little autunite, uranophane, and possibly meta-torbernite: 1073.

Clays, Uranium-bearing

Clinton: uranium occurs in a fault zone 15 ft. wide and over 400 ft. long and in several small faults having a displacement of less than 10 in.; area is underlain by folded and faulted Kittatinny limestone of Cambro-Ordovician age; uranium deposition probably was controlled by the faults which strike west and dip nearly vertical or steeply south; greatest U concentration in fault zone in the clayey gouge or in glassy coatings on fractures and X-ray powder patterns of four samples showed apatite and dolomite in carbonate material in all four and montmorillonite in one: 995; these U occurrences are of too low grade to be of current economic interest according to outcrop radiometry and to samples taken in 1952: 995.

Dolomite, Uranium-bearing

Clinton: uranium also occurs in an unknown form disseminated in two 4-inch layers of black siliceous dolomite near a fault and in several zones of residual soil: 995; these U occurrences are of too low grade to be of current economic interest according to outcrop radiometry and to samples taken in 1952: 995.

NEW JERSEY (contd.)

Hunterdon County (contd.)

Geophysical Exploration (Airborne)

General: no significant radioactivity found in a 25-day survey with an airborne scintillometer in a plane flying 100 ft. above the ground over an area of west central New Jersey and eastern Pennsylvania extending from Clinton through Flemington to Lambertville in New Jersey and west to Doylestown, Pennsylvania: 1086.

Limestone, Uranium-bearing

Mulligan quarry on W bank of Raritan River at Clinton: quarry in Kittatinny limestone; at S end 15-ft. shear zone strikes N 25° E and dips about 85° NW and can be traced for about 500 ft.; shear zone shows varying degrees of radioactivity, which in general decreases to the southwest; sample from most shear part assayed 0.008% eU but is not representative, assay is too low; Geiger counter measurements at outcrop show that a different sample of uraniferous limestone, presumably from this zone and submitted to U.S.G.S., assayed 0.068% U; a yellowish-tan earthy material from shear zone, identified as apatite by X-ray, showed presence of U in fluorescent bead tests; north end of quarry, 500 ft. N of shear zone, has most radioactive part of the limestone; a 4-inch layer of black limestone here, conformable to bedding, measured 0.7 mr/hr. and a sample assayed 0.046% U; part of a vertical joint surface, 5 ft. below black layer, is coated with an unidentified radioactive yellowish-green mineral, of which a sample assayed 0.007% U; economic possibilities probably could be determined by diamond drilling one or two core holes in shear zone since surface anomalies may reflect greater concentrations of U at depth: 843;

NEW JERSEY (contd.)

Hunterdon County (contd.)

Limestone, Uranium-bearing

Mulligan quarry at Clinton: uraniferous shear zone in Cambrian limestone; radioactivity anomalies also present in surrounding area; fluorapatite, probably radioactive, only unusual mineral identified so far: 994.

Pasture 1500 ft. NW of Mulligan quarry: areas as much as 100 ft. square measure from 0.05 to 0.20 mr/hr, but there is no outcrop at these places; although they are not on the strike with shear zone in the quarry, the inference is made that similar radioactive shear zones may exist beneath the soil; since U compounds leach readily and U is easily transported, anomalies detected on surface may possibly reflect greater U concentrations at depth; economic possibilities probably could be determined from information found by bulldozing a trench 100 ft. long and 4 ft. deep in pasture: 843.

Metatorbernite Occurrences

Stockton, ½ mi. NW of, in sandstone quarry: torbernite and metatorbernite found in a roughly tabular copper-uranium-iron-manganese zone, 10 ft. wide, extending from quarry face to quarry face through a sandstone ridge, 25 ft. high and 50 ft. thick in the Stockton formation; joint surfaces within the mineralized zone are coated with manganese and iron stains and films and, in places, with torbernite and muscovite: 973; rock within the mineralized zone averages approximately 0.009% U with a few small spots containing up to 1.24% U, while outward from this zone radioactivity decreases gradually for 20 to 30 ft.; the remaining quarry rocks are estimated to contain less than 0.003% eU;

NEW JERSEY (contd.)

Hunterdon County (contd.)

Meta-torbernite Occurrences

Stockton, ½ mi. NW of, in sandstone quarry: based on surface measurements of the mineralized zone as being 25 x 50 x 10 ft. and on 160 lbs. as weight per cubic ft. of sandstone, ore reserves are estimated as 1,000 t. rock containing 0.009% U or 180 lbs. uranium: 973; origin: mineralogy suggests a possible hydrothermal origin for torbernite deposit; primary uranium minerals may exist below the zone of oxidation beneath the ridge; exploratory drilling might furnish further information on the mineralized zone: 973.

Stockton in road bank near Delaware River: small crystals of torbernite, a little autunite, uranophane and possibly meta-torbernite: 1073.

Radioactive Clay

Raven Rock, in a sandstone quarry 4 mi. N of Stockton torbernite deposit: radioactive clay in underlying fine-grained sandstone near top of Stockton formation of Triassic age occurs as a lenticular mixture of clay galls and sandstone with some pyrite, gypsum, and limonite; clay appears to be hydrothermally altered and showed a radioactivity of 0.28% eU; two samples of sandstone mixed with clay showed 0.034 and 0.017% eU: 994.

Radioactive Copper Deposits

Flemington, at SW corner of Mine Street and Shields Avenue in abandoned copper mines: radioactivity of a sample from most mineralized portion of outcrop of mineralized diabase dike, less than 0.001% eU and no U; probably this is an old contact metamorphic type deposit in which Cu sulfides were deposited in Triassic Lockatong shale within a few ft. of contact with diabase dikes and sills: 973.

NEW JERSEY (contd.)

Hunterdon County (contd.)

Radioactive Occurrences

General: no radioactivity detected in the Cokesbury mine, large mine 2 mi. SE of Clinton, High Bridge mine, Neighbors mine, Silverthorne mine, Swayze mine, Van Syckles mine and Welch mine: 843.

Radioactive Rocks

Annandale graphite mine on property of New Jersey Reformatory at Annandale, 2 mi. E of Clinton: maximum radioactivity 0.05 mr/hr. in graphite schist cut by pegmatite of which parts were slightly radioactive: 843.

Mulligan quarry at Clinton: radioactivity has been noted in the thin dark cherty seams of the Kittatinny limestone but mineralization is scattered, readings are weak, and radioactivity is not traceable for any distance: 1090.

Oldwick: helium and radioactivity data for basalt, 0.99 x 10^{-5}cc. He/g., 2.3 x 10^{-13}g. Ra/g., 2.26 x 10^{-6}g. Th/g., and 0.44 alpha/mg./hr.: 798.

Oldwick in old quarry: basalt, probably Triassic in age, radioactivity 0.21 ± 0.04 x 10^{-12}g. Ra/g. rock (mean value), 0.60 ± 0.11 x 10^{-6}g. U/g. rock, 2.3 ± 0.6 x 10^{-6}g. Th/g. rock, and Th/U ratio 3.8: 745.

Raven Rock, in a sandstone quarry 4 mi. N of Stockton torbernite deposit: radioactive clay in underlying fine-grained sandstone near top of Stockton formation of Triassic age occurs as a lenticular mixture of clay galls and sandstone with some pyrite, gypsum, and limonite; clay appears to be hydrothermally altered and showed a radioactivity of 0.28% eU; two samples of sandstone mixed with clay showed 0.034 and 0.017% eU: 994.

NEW JERSEY (contd.)

Hunterdon County (contd.)

Sandstone, Uranium-bearing

General: ten occurrences of uranium-bearing argillite in the Lockatong formation and three occurrences of uranium-bearing sandstone in the Stockton formation, both of Triassic age, in Bucks County, Pennsylvania, and in Hunterdon County, New Jersey; argillite contains as much as 0.05% U but usually from 0.01 to 0.02% U while sandstone samples, on which assays were incomplete, were estimated to range from 0.02 to 0.05% U; uranium-bearing sandstone occurrences are small usually less than 50 ft. long and 1-2 ft. thick, the largest being discontinuously radioactive along a strike length of 250 ft.; sandstone is medium to fine-grained, arkosic, and commonly mixed with clay pebbles where U content is greatest; none of the known occurrences of either uranium-bearing argillite or sandstone is economically significant: 995; assays of samples from Hunterdon County, New Jersey, and Bucks County, Pennsylvania, show that the radioactive argillite in the Lockatong formation of Triassic age usually contains from 0.005 to 0.01% U and the sandstone in the Stockton formation of the same age contains from 0.01 to 0.03% U; comparison of the lithologic and mineralogic characteristics of these occurrences with similar ones in other parts of the world suggests that neither the Lockatong nor the Stockton formation is likely to contain high-grade U deposits: 996.

Thorium Occurrences

Oldwick: helium and radioactivity data for basalt, 0.99 x 10^{-5}cc. He/g., 2.3 x 10^{-13}g. Ra/g., 2.26 x 10^{-6}g. Th/g., and 0.44 alpha/mg./hr.: 798; thorium-uranium ratio for Triassic basaltic type rock, 3.6; radioactivity

NEW JERSEY (contd.)

Hunterdon County (contd.)

Thorium Occurrences

Oldwick: of 0.62 x 10^{-6}g. U/g. rock, and 2.26 x 10^{-6}g. Th/g. rock: 800.

Oldwick in old quarry: basalt, probably Triassic in age, radioactivity 0.21 $\pm$ - 0.04 x 10^{-12}g. Ra/g. rock (mean value), 0.60 $\pm$ - 0.11 x 10^{-6}g. U/g. rock, 2.3 $\pm$ - 0.6 x 10^{-6}g. Th/g. rock, and Th/U ratio 3.8: 745.

Torbernite Occurrences

Raven Rock: secondary uranium minerals, especially torbernite, occur as disseminated grains or flakes in the arkosic sandstone of the Newark Series of Triassic age: 1090.

Stockton: autunite and torbernite in small concentrations in arkosic redbeds of the Stockton formation (Triassic): 1005; torbernite: 1072; torbernite in arkoses of Triassic Stockton formation: 509.

Stockton, ½ mi. NW of, in sandstone quarry: torbernite and metatorbenite found in a roughly tabular copper-uranium-iron-manganese zone, 10 ft. wide, extending from quarry face to quarry face through a sandstone ridge, 25 ft. high and 50 ft. thick in the Stockton formation; joint surfaces within the mineralized zone are coated with manganese and iron stains and films and, in places, with torbernite and muscovite: 973; rock within the mineralized zone averages approximately 0.009% U with a few small spots containing up to 1.24% U, while outward from this zone radioactivity decreases gradually for 20 to 30 ft.; the remaining quarry rocks are estimated to contain less than 0.003% eU; based on surface measurements of the mineralized zone as being 20 x 50 x 10 ft. and on

NEW JERSEY (contd.)

Hunterdon County (contd.)

Torbernite Occurrences

Stockton, ½ mi. NW of, in sandstone quarry: 160 lbs. as weight per cubic ft. of sandstone, ore reserves are estimated as 1,000 t. rock containing 0.009% U or 180 lbs. uranium: 973; origin: mineralogy suggests a possible hydrothermal origin for torbernite deposit; primary uranium minerals may exist below the zone of oxidation beneath the ridge; exploratory drilling might furnish further information on the mineralized zone: 973.

Stockton in road bank near Delaware River: small crystals of torbernite, a little autunite, uranophane, and possibly meta-torbernite: 1073.

Uranium Exploration

General: no significant radioactivity found in a 25-day survey with an airborne scintillometer in a plane flying 100 ft. above the ground over an area of west central New Jersey and eastern Pennsylvania extending from Clinton through Flemington to Lambertville in New Jersey and west to Doylestown, Pennsylvania: 1086.

Geophysical Exploration(Airborne)

General: no significant radioactivity found in a 25-day survey with an airborne scintillometer in a plane flying 100 ft. above the ground over an area of west central New Jersey and eastern Pennsylvania extending from Clinton through Flemington to Lambertville in New Jersey and west to Doylestown, Pennsylvania: 1086.

NEW JERSEY (contd.)

Hunterdon County (contd.)

Uranium Occurrences

General: ten occurrences of uranium-bearing argillite in the Lockatong formation and three occurrences of uranium-bearing sandstone in the Stockton formation, both of Triassic age, in Bucks County, Pennsylvania, and in Hunterdon County, New Jersey; argillite contains as much as 0.05% U but usually from 0.01 to 0.02% U while sandstone samples, on which assays were incomplete, were estimated to range from 0.02 to 0.05% U; uranium-bearing sandstone occurrences are small usually less than 50 ft. long and 1-2 ft. thick, the largest being discontinuously radioactive along a strike length of 250 ft.; sandstone is medium to fine-grained, arkosic, and commonly mixed with clay pebbles where U content is greatest; none of the known occurrences of either uranium-bearing argillite or sandstone is economically significant: 995; assays of samples from Hunterdon County, New Jersey, and Bucks County, Pennsylvania, show that the radioactive argillite in the Lockatong formation of Triassic age usually contains from 0.005 to 0.01% U and the sandstone in the Stockton formation of the same age contains from 0.01 to 0.03% U; comparison of the lithologic and mineralogic characteristics of these occurrences with similar ones in other parts of the world suggests that neither the Lockatong nor the Stockton formation is likely to contain high-grade U deposits: 996.

NEW JERSEY (contd.)

Hunterdon County (contd.)

Uranium Occurrences

Byram in quarry 1000 ft. N of railroad station: radioactivity of chip sample of baked argillite in Triassic Lockatong shale baked by adjacent diabase intrusion, 0.004% eU and 0.002% U, while a chip sample from the more radioactive beds in the quarry showed 0.008% eU and 0.005% U: 973.

Clinton: uranium occurs in a fault zone 15 ft. wide and over 400 ft. long and in several small faults having a displacement of less than 10 in.; area is underlain by folded and faulted Kittatinny limestone of Cambro-Ordovician age; uranium deposition probably was controlled by the faults which strike west and dip nearly vertical or steeply south; greatest U concentration in fault zones is in clayey gouge or in glassy coatings on fractures and X-ray powder patterns of four samples showed apatite and dolomite in carbonate material in all four and montmorillonite in one: 995; uranium also occurs in an unknown form disseminated in two four-inch layers of black siliceous dolomite near a fault and in several zones of residual soil: 995; these U occurrences are of too low grade to be of current economic interest according to outcrop radiometry and to samples taken in 1952: 995.

Cokesbury, along dirt road to Califon on E shore of Raritan River: radioactivity of chip sample from 100 ft. outcrop of Precambrian granite gneiss, 0.007% eU and 0.002% U; radioactivity here appears to be due to Th or to lack of equilibrium between U and its daughter products, as shown by comparison of radiometric and chemical analyses: 973.

NEW JERSEY (contd.)

Hunterdon County (contd.)

Uranium Occurrences

Flemington, 4.8 mi. N of, on New Jersey Highway 30: radioactivity of sample of Triassic Lockatong shale from outcrop, 0.003% eU and 0.001% U: 973.

Glen Gardner, in railroad cut 300 ft. SE of station: radioactivity of chip sample across a 20-ft. Precambrian granite dike in granite gneiss, 0.009% eU and 0.002% U; granite gneiss from NW side of dike showed radioactivity of 0.001% eU and 0.001% U; radioactivity here appears to be due to Th or to lack of equilibrium between U and its daughter products, as shown by comparison of radiometric and chemical analyses: 973.

Mulligan quarry on W bank of Raritan River at Clinton: quarry in Kittatinny limestone; at S end 15-ft. shear zone strikes N 25° E and dips about 85° NW and can be traced for about 500 ft.; shear zone shows varying degrees of radioactivity, which in general decreases to the southwest; sample from most shear part assayed 0.008% eU but is not representative, assay is too low; Geiger counter measurements at outcrop show that a different sample of uraniferous limestone, presumably from this zone and submitted to U.S.G.S., assayed 0.068% U; a yellowish-tan earthy material from shear zone, identified as apatite by X-ray, showed presence of U in fluorescent bead tests; north end of quarry, 500 ft. N of shear zone, has most radioactive part of the limestone; a 4-inch layer of black limestone here, conformable to bedding, measured 0.7 mr/hr and a sample assayed 0.046% U; part of a vertical joint surface, 5 ft. below black layer, is coated with an unidentified radioactive yellowish green mineral, of which

NEW JERSEY (contd.)

Hunterdon County (contd.)

Uranium Occurrences

Mulligan quarry on W bank of Raritan River at Clinton: a sample assayed 0.007% U; economic possibilities probably could be determined by diamond drilling one or two core holes in shear zone since surface anomalies may reflect greater concentrations of U at depth: 843; uraniferous shear zone in Cambrian limestone; radioactivity anomalies also present in surrounding area; fluorapatite, probably radioactive, only unusual mineral identified so far: 994.

Mulligan quarry, Pasture 1500 ft. NW of: areas as much as 100 ft. square measure from 0.05 to 0.20 mr/hr. but there is no outcrop at these places; although they are not on the strike with shear zone in the quarry, the inference is made that similar radioactive shear zones may exist beneath the soil; since U compounds leach readily and U is easily transported, anomalies detected on surface may possibly reflect greater U concentrations at depth; economic possibilities probably could be determined from information found by bulldozing a trench 100 ft. long and 4 ft. deep in pasture: 843.

Oldwick: thorium-uranium ratio for Triassic basaltic type rock, 3.6; radioactivity of 0.62×10^{-6}g. U/g. rock, and 2.26×10^{-6}g. Th/g. rock: 800.

Oldwick in old quarry: basalt, probably Triassic in age, radioactivity $0.21 \pm 0.04 \times 10^{-12}$g. Ra/g. rock (mean value), $0.60 \pm 0.11 \times 10^{-6}$g. U/g. rock, $2.3 \pm 0.6 \times 10^{-6}$g. Th/g. rock, and Th/U ratio 3.8: 745

Raven Rock: secondary uranium minerals, especially torbernite, occur as disseminated grains or flakes in the arkosic sandstone of the Newark Series of Triassic age: 1090.

NEW JERSEY (contd.)

Hunterdon County (contd.)

Uranium Occurrences

Stockton: autunite and torbernite in small concentrations in arkosic redbeds of the Stockton formation (Triassic): 1005; torbernite: 1072; torbernite in arkoses of Triassic Stockton formation: 509; secondary uranium minerals, especially torbernite, occur as disseminated grains or flakes in the arkosic sandstone of the Newark Series of Triassic age: 1090.

Stockton, ½ mi. NW of, in sandstone quarry: torbernite and metatorbernite found in a roughly tabular copper-uranium-iron-manganese zone, 10 ft. wide, extending from quarry face to quarry face through a sandstone ridge, 25 ft. high and 50 ft. thick in the Stockton formation; joint surfaces within the mineralized zone are coated with manganese and iron stains and films and, in places, with torbernite and muscovite: 973; rock within the mineralized zone averages approximately 0.009% U with a few small spots containing up to 1.24% U, while outward from this zone radioactivity decreases gradually for 20 to 30 ft.; the remaining quarry rocks are estimated to contain less than 0.003% eU; based on surface measurements of the mineralized zone as being 25 x 50 x 10 ft. and on 160 lbs. as weight per cubic foot of sandstone, ore reserves are estimated as 1,000 t. rock containing 0.009% U or 180 lbs. uranium: 973; origin: mineralogy suggests a possible hydrothermal origin for torbernite deposit; primary uranium minerals may exist below the zone of oxidation beneath the ridge; exploratory drilling might furnish further information on the mineralized zone: 973;

NEW JERSEY (contd.)

Hunterdon County (contd.)

Uranium Occurrences

Stockton ½ mi. NW of, in sandstone quarry:
analyses on 3 samples of sandstone from the Triassic Stockton formation gave respectively 0.033, 0.082, and 0.004% eU and 0.029, 0.090 and 0.094, and 0.002% U, while a fluorescent sandstone gave 0.099% eU and 0.085 and 0.087% U, and fluorescent water from a puddle at foot of outcrop gave less than 0.001% eU and less than 0.001% U: 973.

Stockton in road bank near Delaware River: small crystals of torbernite, a little autunite, uranophane, and possibly meta-torbernite: 1073.

Argillite, Uranium-bearing

General: ten occurrences of uranium-bearing argillite in the Lockatong formation and three occurrences of uranium-bearing sandstone in the Stockton formation, both of Triassic age, in Bucks County, Pennsylvania, and in Hunterdon County, New Jersey, argillite contains as much as 0.05% U but usually from 0.01 to 0.02% U while sandstone samples, on which assays were incomplete, were estimated to range from 0.02 to 0.05% U; uranium-bearing sandstone occurrences are small usually less than 50 ft. long and 1-2 ft. thick, the largest being discontinuously radioactive along a strike length of 250 ft.; sandstone is medium to fine-grained, arkosic, and commonly mixed with clay pebbles where U content is greatest; none of the known occurrences of either uranium-bearing argillite or sandstone is economically significant: 995; assays of samples from Hunterdon County, New Jersey, and Bucks County, Pennsylvania, show that the radioactive argillite in the Lockatong formation of Triassic age usually

NEW JERSEY (contd.)

Hunterdon County (contd.)

Uranium Occurrences

Argillite, Uranium-bearing

General:
contains from 0.005 to 0.01% U and the sandstone in Stockton formation of the same age contains from 0.01 to 0.03% U; comparison of the lithologic and mineralogic characteristics of these occurrences with similar ones in other parts of the world suggests that neither the Lockatong nor the Stockton formation is likely to contain high-grade U deposits: 996.

Clay, Uranium-bearing

Clinton: uranium occurs in a fault zone 15 ft. wide and over 400 ft. long and in several small faults having a displacement of less than 10 in.; area is underlain by folded and faulted Kittatinny limestone of Cambro-Ordovician age; uranium deposition probably was controlled by the faults which strike west and dip nearly vertical or steeply south; greatest U concentration in fault zones is in clayey gouge or in glassy coatings on fractures and X-ray powder patterns of four samples showed apatite and dolomite in carbonate material in all four and montmorillonite in one; these U occurrences are of too low grade to be of current economic interest according to outcrop radiometry and to samples taken in 1952: 995.

Dolomite, Uranium-bearing

Clinton: uranium also occurs in an unknown form disseminated in two 4-inch layers of black siliceous dolomite near a fault and in several zones of residual soil; these uranium occurrences are of too low grade to be of current economic interest according to outcrop radiometry and to samples taken in 1952: 995.

NEW JERSEY (contd.)

Hunterdon County (contd.)
Uranium Occurrences
Limestone, Uranium-bearing
Mulligan quarry on W bank of Raritan River at Clinton: uraniferous shear zone in Cambrian limestone; radioactivity anomalies also present in surrounding area; fluorapatite, probably radioactive, only unusual mineral identified so far: 994.
Sandstone, Uranium-bearing
General: ten occurrences of uranium-bearing argillite in the Lockatong formation and three occurrences of uranium-bearing sandstone in the Stockton formation, both of Triassic age, in Bucks County, Pennsylvania, and in Hunterdon County, New Jersey; argillite contains as much as 0.05 U but usually from 0.01 to 0.02% U while sandstone samples, on which assays were incomplete, were estimated to range from 0.02 to 0.05% U; uranium-bearing sandstone occurrences are small, usually less than 50 ft. long and 1-2 ft. thick, the largest being discontinuously radioactive along a strike length of 250 ft.; sandstone is medium to fine-grained, arkosic, and commonly mixed with clay pebbles where U content is greatest; none of the known occurrences of either uranium-bearing argillite or sandstone is economically significant: 995; assays of samples from Hunterdon County, New Jersey, and Bucks County, Pennsylvania, show that the radioactive argillite in the Lockatong formation of Triassic age usually contains from 0.005 to 0.01% U and the sandstone in the Stockton formation of the same age contains from 0.01 to 0.03% U; comparison of the lithologic and mineralogic characteristics of these occurrences with similar ones in other parts of the world suggests that neither the Lockatong nor the Stockton formation is likely to contain high-grade U deposits: 996.

NEW JERSEY (contd.)

Hunterdon County (contd.)
Uranium Occurrences
Water, Uranium-bearing
Stockton, ½ mi. NW of, in sandstone quarry: torbernite and metatorbernite found in a roughly tabular copper-uranium-iron-manganese zone, 10 ft. wide, extending from quarry face to quarry face through a sandstone ridge, 25 ft. high and 50 ft. thick in the Stockton formation; joint surfaces within the mineralized zone are coated with manganese and iron stains and films and, in places, with torbernite and muscovite: 973; analyses on 3 samples of sandstone from the Triassic Stockton formation gave respectively 0.033, 0.082, and 0.004% eU and 0.029, 0.090 and 0.094, and 0.002% U, while a fluorescent sandstone gave 0.099% eU and 0.085 and 0.087% U, and fluorescent water from a puddle at foot of outcrop gave less than 0.001% eU and less than 0.001% U: 973.
Uranophane Occurrences
Stockton in road bank near Delaware River: small crystals of torbernite, a little autunite, uranophane, and possibly metatorbernite: 1073.
Water, Uranium-bearing
Stockton, ½ mi. NW of, in sandstone quarry: torbernite and metatorbernite found in a roughly tabular copper-uranium-iron-manganese zone, 10 ft. wide, extending from quarry face to quarry face through a sandstone ridge, 25 ft. high and 50 ft. thick in the Stockton formation; joint surfaces within the mineralized zone are coated with manganese and iron stains and films and, in places, with torbernite and muscovite: 973; analyses on 3 samples of sandstone from the Triassic Stockton formation gave respectively 0.033, 0.082, and 0.004% eU and

NEW JERSEY (contd.)

Hunterdon County (contd.)

Water, Uranium-bearing

Stockton, ½ mi. NW of, in sandstone quarry: 0.029, 0.090 and 0.094, and 0.002% U, while a fluorescent sandstone gave 0.099% eU and 0.085 and 0.087% U, and fluorescent water from a puddle at foot of outcrop gave less than 0.001% eU and less than 0.001% U: 973.

Iron Deposits, Thorium-bearing

See under individual county names and under Index III, Iron Deposits, Thorium-bearing-New Jersey: 1005, 1103.

Iron Deposits, Uranium-bearing

See under individual county names and under Index III, Iron Deposits, Uranium-bearing-New Jersey: 708, 883, 1005, 1103.

Limestones, Uranium-bearing

See under individual county names and under Index III, Limestones, Uranium-bearing-New Jersey: 27, 426, 841, 843, 994.

Magnetite, Thorium-bearing

See under individual county names and under Index III, Magnetite, Thorium-bearing-New Jersey: 843.

Magnetite, Uranium-bearing

See under individual county names and under Index III, Magnetite, Uranium-bearing-New Jersey: 843, 1090.

Mercer County

Uranium Occurrences

Woodsville, 0.8 mi. S of, on unnumbered blacktop road: radioactivity of sample of baked shale and sandstone from top part of outcrop of Triassic Lockatong shale, 0.006% eU and 0.002% U; radioactivity of a sample from the bottom part of the same outcrop, 0.004% eU and 0.001% U: 973.

NEW JERSEY (contd.)

Meta-torbernite Occurrences

See under individual county names and under Index III, Meta-torbernite Occurrences-New Jersey: 973, 1073.

Monazite Occurrences

See under individual county names and under Index III, Thorium Occurrences-New Jersey: 844.

Monmouth County

Beach Sands, Thorium-bearing

Asbury Park at Second Avenue: Sample 24, traces of monazite in beach sand of 0.105 mm. size: 844.

Sandy Hook: traces of monazite in sea bottom samples of sand of 0.210 mm. size (Sample B-13) and 0.149 mm. size (Sample B-21): 844.

Sandy Hook at Fire Road 10, Fort Hancock: Sample 9, traces of monazite in beach sand of 0.105 mm. size: 844.

West End at 150 ft. S of Brighton Avenue: Sample S-5, traces of monazite in source samples from Cape May formation on beach in sands of 0.105 and 0.210 mm. size: 844.

Monazite Occurrences

Asbury Park at Second Avenue: Sample 44, traces of monazite in beach sand of 0.105 mm. size: 844.

Sandy Hook: traces of monazite in sea bottom samples of sand of 0.210 mm. size (Sample B-13) and 0.149 mm. size (Sample B-21): 844.

Sandy Hook at Fire Road 10, Fort Hancock: Sample 9, traces of monazite in beach sand of 0.105 mm. size: 844.

West End at 150 ft. S of Brighton Avenue: Sample S-5, traces of monazite in source samples from Cape May formation on beach in sands of 0.105 and 0.210 mm. size: 844.

Thorium Occurrences

Asbury Park at Second Avenue: Sample 44, traces of monazite in beach sand of 0.105 mm. size: 844.

NEW JERSEY (contd.)

Monmouth County (contd.)

Thorium Occurrences

Sandy Hook: traces of monazite in sea bottom samples of sand of 0.210 mm. size (Sample B-13) and 0.149 mm. size (Sample B-21): 844.

Sandy Hook at Fire Road 10, Fort Hancock: Sample 9, traces of monazite in beach sand of 0.105 mm. size: 844.

West End at 150 ft. S of Brighton Avenue: Sample S-5, traces of monazite in source samples from Cape May formation on beach in sands of 0.105 and 0.210 mm. size: 844.

Morris County

Allanite Occurrences

Hibernia mines: allanite, rutile, sphene, zircon, usually present in pegmatite masses cutting orebody of iron mines: 876.

Jackson mine, 16 mi. NE of Dover behind Pompton Crushed Stone Co. quarry: radioactivity of area reported to be a small vein of magnetite cut by pegmatite but outcropping as a magnetite-bearing pegmatite in hornblende gneiss, 0.17 mr/hr; minerals found on dump include allanite and zircon, both radioactive; radioactivity of a sample of magnetite-bearing pegmatite from dump, 0.025% eU and 0.002% U, of a grab sample of magnetite ore, which also contains allanite, from dump near pipeline, 0.010% eU, 0.001% U, and 0.020% ThO_2, and of a sample of magnetite-bearing pegmatite, 0.001% eU: 843.

Mt. Freedom: allanite in drift: 846, 997; allanite pebble 5 ft. below surface of a shaft: 691.

NEW JERSEY (contd.)

Morris County (contd.)

Apatite, Thorium-bearing

Canfield phosphate mine, 2 mi. W of Dover: radioactivity of rock on dumps around caved shafts of old iron mine caused by apatite and monazite; ore is granular aggregate of magnetite and greenish-gray apatite with quartz, feldspar, and biotite as minor constituents; the monazite is several times more radioactive than the apatite but very little is present in the rock, so that the apatite is the preponderant radioactive mineral in the rock; U and Th content of deposit judged too low to merit further study: 843.

Apatite, Uranium-bearing

Canfield phosphate mine, 2 mi. W of Dover: radioactivity of rock on dumps around caved shafts of old iron mine caused by apatite and monazite; ore is granular aggregate of magnetite and greenish-gray apatite with quartz, feldspar, and biotite as minor constituents; the monazite is several times more radioactive than the apatite but very little is present in the rock, so that the apatite is the preponderant radioactive mineral in the rock; U and Th content of deposit judged too low to merit further study: 843.

Bastnaesite Occurrences

Dover

Scrub Oaks iron mine: doverite, a new mineral, occurs mixed with xenotime, hematite, and quartz in aggregates, which are irregular and may have bastnaesite rims: doverite is brownish-red, forms the bulk of the aggregates, and is an yttrium analog of synchisite; chemical analysis of the aggregates gave 44.36% rare earth oxides, 1.62% ThO_2, and 0.22% UO_3: 1113.

NEW JERSEY (contd.)

Morris County (contd.)

Gummite Occurrences

Crane Iron Company mine near Mt. Olive, Roxbury Township: small scales of uranite of yellowish-green color coating decomposed feldspar and grains of magnetic iron ore and associated with two other uranium minerals that resemble uranochre and gummite; physical and chemical properties of the minerals discussed: 708; bead tests on uranochre-and gummite-like minerals: 708; mineralogy: 708;

material on dump included uranite coating feldspar and magnetite, and small amounts of uranochre and gummite: 660.

Iron Deposits, Uranium-bearing

Crane Iron Company mine near Mt. Olive, Roxbury Township: small scales of uranite of yellowish-green color coating decomposed feldspar and grains of magnetic iron ore and associated with two other uranium minerals that resemble uranochre and gummite; physical and chemical properties of the minerals discussed: 708.

Magnetite, Thorium-bearing

Canfield phosphate mine, 2 mi. W of Dover: radioactivity of rock on dumps around caved shafts of old iron mine caused by apatite and monazite; ore is granular aggregate of magnetite and greenish-gray apatite with quartz, feldspar, and biotite as minor constituents; the monazite is several times more radioactive than the apatite but very little is present in the rock, so that the apatite is the preponderant radioactive mineral in the rock; U and Th content of deposit judged too low to merit further study: 843.

Magnetite, Uranium-bearing

Boonton area: uranium in magnetite deposits: 1090.

NEW JERSEY (contd.)

Morris County (contd.)

Magnetite, Uranium-bearing

Canfield phosphate mine, 2 mi. W of Dover: radioactivity of rock on dumps around caved shafts of old iron mine caused by apatite and monazite; ore is granular aggregate of magnetite and greenish-gray apatite with quartz, feldspar, and biotite as minor constituents; the monazite is several times more radioactive than the apatite but very little is present in the rock, so that the apatite is the preponderant radioactive mineral in the rock; U and Th content of deposit judged too low to merit further study: 843.

Hibernia: uranium in magnetite deposits: 1090.

Monazite Occurrences

Canfield phosphate mine, 2 mi. W of Dover: radioactivity of rock on dumps around caved shafts of old iron mine caused by apatite and monazite; ore is granular aggregate of magnetite and greenish-gray apatite with quartz, feldspar, and biotite as minor constituents; the monazite is several times more radioactive than the apatite but very little is present in the rock, so that the apatite is the preponderant radioactive mineral in the rock; U and Th content of deposit judged too low to merit further study: 843.

Radioactive Magnetite

Copper mine, 9 mi. SW of Dover: radioactivity of magnetite-hematite ore in hornblende gneiss, less than 0.03 mr/hr.: 843.

Ford: age determination tests on one specimen of magnetite gave the following results: No. 1064 gave 0.21 activity by radon-thoron count and an age of 550 m.y., and 0.358 activity by direct alpha count and an age of 327 m.y., and 3.95 He: 785.

NEW JERSEY (contd.)

Morris County (contd.)

Radioactive Magnetite

Hacklebarney group of mines along Black River 12 mi. SW of Dover: radioactivity of mixture of hematite and magnetite in gneiss, less than 0.03 mr/hr.: 843.

Hibernia anomaly, 3 mi. N of Dover: limonite-stained radioactive gneiss in the open cut, decomposed to friable mass of quartz, feldspar, and limonite; radioactive zone is from 5-9 feet wide and over 200 ft. long and its radioactivity ranges from 0.05 to 0.45 mr/hr., with an average of 0.08 mr/hr.; zone is part of low-grade disseminated magnetite orebody recently explored by stripping: 996.

Jackson mine, 16 mi. NE of Dover behind Pompton Crushed Stone Co. quarry: radioactivity of area reported to be a small vein of magnetite cut by pegmatite but outcropping as a magnetite-bearing pegmatite in hornblende gneiss, 0.17 mr/hr; minerals found on dump include allanite and zircon, both radioactive; radioactivity of a sample of magnetite-bearing pegmatite from dump, 0.025% eU and 0.002% U, of a grab sample of magnetite ore, which also contains allanite, from dump near pipeline, 0.010% eU, 0.001% U, and 0.020% ThO_2, and of a sample of magnetite-bearing pegmatite, 0.001% eU: 843.

Mount Hope mine, 2 mi. N of Dover: radioactivity of magnetite orebodies as replacements of gneiss, 0.04 mr/hr.; radioactivity of sample of tailings from new pile, 0.003% eU and 0.002% U, and of a lump of magnetite ore, 0.001% eU: 843.

Richard mine, 2 mi. N of Dover, operated by Colorado Fuel and Iron Co.: radioactivity of syenite pegmatite in drill core of magnetite replacement of Pochuck and Losee gneisses, 0.04 mr/hr.; sample of fine tailings gave 0.002% eU: 843.

NEW JERSEY (contd.)

Morris County (contd.)

Radioactive Magnetite

Scrub Oaks mine, 2 mi. W of Dover, operated by Alan Wood Steel Co.: no radioactivity detected in large low-grade magnetite deposit disseminated in gneiss; sample of magnetite concentrates gave 0.001% eU: 843.

Radioactive Occurrences

General: no radioactivity reported in Birch mine, Busche graphite mine, Crane mine, Gold Diggings prospect, Kahart mine, and Taylor mine: 843.

Derenberger mine in village of Schooleys Mountain 10 mi. SW of Netcong: radioactivity of dump(?) rock along road at supposed site of mine, less than 0.03 mr/hr.: 843.

Stoutenberg mine on Stevens farm 8 mi. SW of Netcong: radioactivity of area now a farmland with no outcrops and workings completely filled, less than 0.03 mr/hr.: 843.

Thorium Occurrences

Canfield phosphate mine, 2 mi. W of Dover: radioactivity of rock on dumps around caved shafts of old iron mine caused by apatite and monazite; ore is granular aggregate of magnetite and greenish-gray apatite with quartz, feldspar, and biotite as minor constituents; the monazite is several times more radioactive than the apatite but very little is present in the rock, so that the apatite is the preponderant radioactive mineral in the rock; U and Th content of deposit judged too low to merit further study: 843.

Dover

Scrub Oaks iron mine: doverite, a new mineral, occurs mixed with xenotime, hematite, and quartz in aggregates which are irregular and may have bastnaesite rims; doverite is brownish red, forms the bulk of the aggregates and is an yttrium analog of synchisite; chemical analysis of the aggregates gave 44.38% rare earth oxides, [illegible] ThO_2 and 0.29% WO_3: 1113.

NEW JERSEY (contd.)

Morris County (contd.)
Thorium Occurrences
Dover
Scrub Oaks iron mine: of the aggregates gave 44.36% rare earth oxides, 1.62% ThO_2 and 0.22% UO_3: 1113.
Hibernia mines: allanite, rutile, sphene, zircon, usually present in pegmatite masses cutting orebody of iron mines: 876.
Jackson mine, 16 mi. NE of Dover behind Pompton Crushed Stone Co. quarry: radioactivity of area reported to be a small vein of magnetite cut by pegmatite but outcropping as a magnetite-bearing pegmatite in hornblende gneiss, 0.17 mr/hr; minerals found on dump include allanite and zircon, both radioactive; radioactivity of a sample of magnetite-bearing pegmatite from dump, 0.025% eU and 0.002% U, of a grab sample of magnetite ore, which also contains allanite, from dump near pipeline, 0.010% eU, 0.001% U, and 0.020% ThO_2, and of a sample of magnetite-bearing pegmatite, 0.001% eU: 843.
Mt. Freedom: allanite in drift: 846, 997; allanite pebble 5 ft. below surface of a shaft: 691.
Apatite, Thorium-bearing
Canfield phosphate mine, 2 mi. W of Dover: radioactivity of rock on dumps around caved shafts of old iron mine caused by apatite and monazite; ore is granular aggregate of magnetite and greenish-gray apatite with quartz, feldspar, and biotite as minor constituents; the monazite is several times more radioactive than the apatite but very little is present in the rock, so that the apatite is the preponderant radioactive mineral in the rock; U and Th content of deposit judged too low to merit further study: 843.

NEW JERSEY (contd.)

Morris County (contd.)
Thorium Occurrences
Magnetite, Thorium-bearing
Canfield phosphate mine, 2 mi. W of Dover: radioactivity of rock on dumps around caved shafts of old iron mine caused by apatite and monazite; ore is granular aggregate of magnetite and greenish-gray apatite with quartz, feldspar, and biotite as minor constituents; the monazite is several times more radioactive than the apatite but very little is present in the rock, so that the apatite is the preponderant radioactive mineral in the rock; U and Th content of deposit judged too low to merit further study: 843.
Uranite Occurrences
Crane Iron Company mine near Mt. Olive, Roxbury Township: small scales of uranite of yellowish-green color coating decomposed feldspar and grains of magnetic iron ore and associated with two other uranium minerals that resemble uranochre and gummite; physical and chemical properties of the minerals discussed: 708; material on dump included uranite coating feldspar and magnetite, and small amounts of uranochre and gummite: 660; uranite: 846; bead tests on uranochre-and gummite-like minerals: 708; mineralogy: 708.
Mount Olive: uranite, questionable occurrence: 997.
Mount Olive mines: very doubtful occurrences of uranite: 691.
Uranium Occurrences
Boonton area: uranium in magnetite deposits: 1090.
Canfield phosphate mine, 2 mi. W of Dover: radioactivity of rock on dumps around caved shafts of old iron mine caused by apatite and monazite; ore is granular

NEW JERSEY (contd.)

Morris County (contd.)
Uranium Occurrences
Canfield phosphate mine, 2 mi. W of Dover:
aggregate of magnetite and greenish-gray apatite with quartz, feldspar, and biotite as minor constituents; the monazite is several times more radioactive than the apatite but very little is present in the rock, so that the apatite is the preponderant radioactive mineral in the rock; U and Th content of deposit judged too low to merit further study: 843.
Crane Iron Company mine near Mt. Olive, Roxbury Township: small scales of uranite of yellowish-green color coating decomposed feldspar and grains of magnetic iron ore and associated with two other uranium minerals that resemble uranochre and gummite; physical and chemical properties of the minerals discussed: 708; material on dump included uranite coating feldspar and magnetite, and small amounts of uranochre and gummite: 660; uranite: 846; bead tests on uranochre and gummite-like minerals: 708; mineralogy: 708.
Dover
Scrub Oaks iron mine: doverite, a new mineral, occurs mixed with xenotime, hematite, and quartz in aggregates, which are irregular and may have bastnaesite rims; doverite is brownish red, forms the bulk of the aggregates, and is an yttrium analog of synchisite; chemical analysis of the aggregates gave 44.36% rare earth oxides, 1.62% ThO_2 and 0.22% UO_3: 1113.
Dover, Area 2 mi. N of: uranium discovery reported at this locality in 1954 by New Jersey state geologist; locations of two additional discoveries were not given: 1102.
Hibernia: uranium in magnetite deposits: 1090.

NEW JERSEY

Morris County (contd.)
Uranium Occurrences
Jackson mine, 16 mi. NE of Dover behind Pompton Crushed Stone Co. quarry: radioactivity of area reported to be a small vein of magnetite cut by pegmatite but outcropping as a magnetite-bearing pegmatite in hornblende gneiss, 0.17 mr/hr; minerals found on dump include allanite and zircon, both radioactive; radioactivity of a sample of magnetite-bearing pegmatite from dump, 0.025% eU and 0.002% U, of a grab sample of magnetite ore, which also contains allanite, from dump near pipeline, 0.010% eU, 0.001% U, and 0.020% ThO_2, and of a sample of magnetite-bearing pegmatite, 0.001% eU: 843.
Mount Hope mine, 2 mi. N of Dover: radioactivity of magnetite orebodies as replacements of gneiss, 0.04 mr/hr; radioactivity of sample of tailings from new pile, 0.003% eU and 0.002% U, and of a lump of magnetite ore, 0.001% eU: 843.
Mount Olive: uranite, questionable occurrence: 997.
Mount Olive mines: very doubtful occurrence of uranite: 691.
Apatite, Uranium-bearing
Canfield phosphate mine, 2 mi. W of Dover: radioactivity of rock on dumps around caved shafts of old iron mine caused by apatite and monazite; ore is granular aggregate of magnetite and greenish-gray apatite with quartz, feldspar, and biotite as minor constituents; the monazite is several times more radioactive than the apatite but very little is present in the rock, so that the apatite is the preponderant radioactive mineral in the rock; U and Th content of deposit judged too low to merit further study: 843.

NEW JERSEY (contd.)

Morris County (contd.)
Uranium Occurrences
Iron Deposits, Uranium-bearing
Crane Iron Company mine near Mt. Olive, Roxbury Township: small scales of uranite of yellowish-green color coating decomposed feldspar and grains of magnetic iron ore and associated with two other uranium minerals that resemble uranochre and gummite; physical and chemical properties of the minerals discussed: 708.
Magnetite, Uranium-bearing
Boonton area: uranium in magnetite deposits: 1090.
Canfield phosphate mine, 2 mi. W of Dover: radioactivity of rock on dumps around caved shafts of old iron mine caused by apatite and monazite; ore is granular aggregate of magnetite and greenish-gray apatite with quartz, feldspar, and biotite as minor constituents; the monazite is several times more radioactive than the apatite but very little is present in the rock, so that the apatite is the preponderant radioactive mineral in the rock; U and Th content of deposit judged too low to merit further study: 843.
Hibernia: uranium in magnetite deposits: 1090.
Uranochre Occurrences
Crane Iron Company mine near Mt. Olive, Roxbury Township: small scales of uranite of yellowish-green color coating decomposed feldspar and grains of magnetic iron ore and associated with two other uranium minerals that resemble uranochre and gummite; physical and chemical properties of the minerals discussed: 708; material on dump included uranite coating feldspar and magnetite, and small amounts of uranochre and gummite: 660; bead tests on uranochre- and gummite-like minerals: 708; mineralogy: 708.

NEW JERSEY (contd.)

Morris County (contd.)
Xenotime Occurrences
Dover
Scrub Oaks iron mine: doverite, a new mineral, occurs mixed with xenotime, hematite, and quartz in aggregates, which are irregular and may have bastnaesite rims; doverite is brownish red, forms the bulk of the aggregates, and is an yttrium analog of synchisite; chemical analysis of the aggregates gave 44.36% rare earth oxides, 1.62% ThO_2, and 0.22% UO_3: 1113.

Ocean County
Beach Sands, Thorium-bearing
Island Beach, 0.8 mi. S of U.S. Coast Guard station 112: Sample 54, traces of monazite in beach sand of 0.149 mm. size: 844.
Seaside Park at Stockton Avenue: Sample 44, traces of monazite in beach sand of 0.105 mm. size: 844.
Surf City at 8th Street: Sample 64, traces of monazite in beach sand of 0.074 and 0.105 mm. size: 844.
Tucker Island, 0.3 mi. S of north point on: Sample 77, traces of monazite in beach sand of 0.149 mm. size: 844.
Monazite Occurrences
Island Beach, 0.8 mi. S of U.S. Coast Guard station 112: Sample 54, traces of monazite in beach sand of 0.149 mm. size: 844.
Seaside Park at Stockton Avenue: Sample 44, traces of monazite in beach sand of 0.105 mm. size: 844.
Surf City at 8th St.: Sample 64, traces of monazite in beach sand of 0.074 and 0.105 mm. size: 844.
Tucker Island, 0.3 mi. S of north point on: Sample 77, traces of monazite in beach sand of 0.149 mm. size: 844.
Thorium Occurrences
Island Beach, 0.8 mi. S of U.S. Coast Guard station 112: Sample 54, traces of monazite in beach sand of 0.149 mm. size: 844.

NEW JERSEY (contd.)

Ocean County (contd.)

Thorium Occurrences

Seaside Park at Stockton Avenue: Sample 44, traces of monazite in beach sand of 0.105 mm. size: 844.

Surf City at 8th St.: Sample 64, traces of monazite in beach sand of 0.074 and 0.105 mm. size: 844.

Tucker Island, 0.3 mi. S of north point on: Sample 77, traces of monazite in beach sand of 0.149 mm. size: 844.

Origin of Carnotite Occurrences

See under individual county names and under Index III, Origin-Carnotite Occurrences-New Jersey: 688.

Origin of Torbernite Occurrences

See under individual county names and under Index III, Origin-Torbernite Occurrences-New Jersey: 973.

Origin of Uranium Occurrences

See under individual county names and under Index III, Origin-Uranium Occurrences-New Jersey: 688, 843, 973.

Passaic County

Allanite Occurrences

Peters mine at Ringwood: allanite, rutile, sphene, zircon, usually present in pegmatite masses cutting orebody of iron mines: 876.

Monazite Occurrences

Ringwood mines 4 mi. E of S end of Greenwood Lake at Ringwood: radioactivity less than 0.03 mr/hr. for several magnetite orebodies, in which magnetite replaces Pochunk gneiss, pegmatites cut gneiss, and one monazite crystal was found in pegmatite float at Cannon mine: 843.

Radioactive Magnetite

Ringwood: age determination tests on one specimen of magnetite gave the following results: No. 1053 gave 0.77 activity by radon-thoron

NEW JERSEY (contd.)

Passaic County (contd.)

Radioactive Magnetite

Ringwood: age determination tests on one specimen of magnetite gave the following results: No. 1053 gave 0.77 activity by radon-thoron count and an age of 410 m.y., and 1.97 activity by direct alpha count and an age of 159 m.y., and 10.6 He: 785.

Ringwood mines 4 mi. E of S end of Greenwood Lake at Ringwood: radioactivity less than 0.03 mr/hr. for several magnetite orebodies in which magnetite replaces Pochuck gneiss, pegmatites cut gneiss, and one monazite crystal was found in pegmatite float at Cannon mine: 843.

Radioactive Rocks

Mountain View: Third Watchung basalt, 7 ft. below surface in road cut, activity 1.49 x 10^{-5}cc. He/g.: 786.

Packanack Mountain: Third Watchung basalt, 15 ft. below surface in old quarry, activity 1.31 x 10^{-5}cc. He/g.: 786.

Paterson: Second Watchung basalt, 100 ft. below surface activity 0.77 x 10^{-5}cc. He/g.: 786.

Preakness Mountain: Second Watchung basalt, 4 ft. below surface in road cut, activity 0.72 x 10^{-5}cc. He/g.: 786.

Thorium Occurrences

Peters mine at Ringwood: allanite, rutile, sphene, zircon, usually present in pegmatite masses cutting orebody of iron mines: 876.

Ringwood mines 4 mi. E of S end of Greenwood Lake at Ringwood: radioactivity of several magnetite orebodies in which magnetite replaces Pochuck gneiss, pegmatites cut gneiss, and one monazite crystal found in pegmatite float at Cannon mine, less than 0.03 mr/hr.: 843.

NEW JERSEY (contd.)

Pitchblende Occurrences
See under individual county names and under Index III, Pitchblende Occurrences-New Jersey: 841, 1090.

Prospectors' Guides
See under individual county names and under Index III, Prospectors' Guides-New Jersey: 1090, 1101.

Radioactive Carbonaceous Deposits
See under individual county names and under Index III, Radioactive Carbonaceous Deposits-New Jersey: 1005.

Radioactive Clay
See under individual county names and under Index III, Radioactive Clay-New Jersey: 994.

Radioactive Copper Deposits
See under individual county names and under Index III, Radioactive Copper Deposits-New Jersey: 973.

Radioactive Hematite
See under individual county names and under Index III, Radioactive Hematite-New Jersey: 843.

Radioactive Magnetite
See under individual county names and under Index III, Radioactive Magnetite-New Jersey: 785, 843, 996.

Radioactive Minerals
See under individual county names and under Index III, Radioactive Minerals-New Jersey: 798.

Radioactive Occurrences
See under individual county names and under Index III, Radioactive Occurrences-New Jersey: 45, 843, 994.
Bibliography: 767.

NEW JERSEY (contd.)

Radioactive Rocks
See under individual county names and under Index III, Radioactive Rocks-New Jersey: 745, 786, 798, 803, 843, 935, 994, 1090.

Sandstone, Uranium-bearing
See under individual county names and umder Index III, Sandstone, Uranium-bearing-New Jersey: 995, 996.

Somerset County
Radioactive Copper Deposits
Somerville, 1 mi. N of, in abandoned copper mine: radioactivity of grab sample of a baked shale from most cupriferous parts of dump, less than 0.001% eU, and no U; probably this is an old contact metamorphic type deposit in which Cu sulfides were deposited in Triassic Lockatong shale within a few feet of contact with diabase dikes and sills; native copper and silver were found here: 973.
Radioactive Rocks
General: diabase, mean value of radioactivity $0.19 \pm 0.02 \times 10^{-12}$g. Ra/g. rock: 745.
Chimney Rock quarry N of Somerville: First Watchung basalt, 50-100 ft. below surface of quarry, activity 0.42×10^{-5}cc. He/g.: 786.
Kingston: Palisade diabase, 20 ft. below surface in quarry, activity 1.01×10^{-5}cc. He/g., 0.17×10^{-12}g. Ra/g., 2.60×10^{-6}g. Th/g., and age ratio 76 m. y.: 786.
Kingston trap quarry at Kingston on road to Rocky Hill: Palisade diabase, radioactivity $0.17 \pm 0.01 \times 10^{-12}$g. Ra/g. rock: 745; average U and Th content found from average activity of 5 samples, 4 from New Jersey and 1 from New York, $0.54 \pm 0.05 \times 10^{-6}$g. U/g. rock, $2.2 \pm 0.3 \times 10^{-6}$g. Th/g. rock, and Th/U ratio 4.0: 745.
Thorium Occurrences
Kingston: Palisade diabase, 20 ft. below surface in quarry, activity

NEW JERSEY (contd.)

Somerset County (contd.)

Thorium Occurrences

Kingston: 1.01×10^{-5}cc. He/g., 0.17×10^{-12}g. Ra/g., 2.60×10^{-6}g. Th/g., and age ratio 76 m. y.: 786.

Kingston trap quarry at Kingston on road to Rocky Hill: Palisade diabase, radioactivity $0.17 \pm 0.01 \times 10^{-12}$g. Ra/g. rock: 745; average U and Th content found found from average activity of 5 samples, 4 from New Jersey and 1 from New York, $0.54 \pm 0.05 \times 10^{-6}$g. U/g. rock, $2.2 \pm 0.3 \times 10^{-6}$g. Th/g. rock, and Th/U ratio 4.0: 745.

Uranium Occurrences

Kingston trap quarry at Kingston on road to Rocky Hill: Palisade diabase, radioactivity $0.17 \pm 0.01 \times 10^{-12}$g. Ra/g. rock: 745; average U and Th content found from average activity of 5 samples, 4 from New Jersey and 1 from New York, $0.54 \pm 0.05 \times 10^{-6}$g. U/g. rock, $2.2 \pm 0.3 \times 10^{-6}$g. Th/g. rock, and Th/U ratio 4.0: 745.

Sussex County

Allanite Occurrences

General: allanite: 249.

Andover Mining District

Sulphur Hill mine: allanite as a minor accessory in the biotite-quartz-feldspar gneiss of the skarn deposit: 961.

Byram township

Losee Pond, NE of: allanite in fine-grained biotite phase of "Oxford type" of Byram gneiss: 969.

Sand Pond: allanite in bronzy gneiss with little hornblende, a phase of Byram gneiss: 969.

Edison: allanite, autunite: 846.

NEW JERSEY (contd.)

Sussex County (contd.)

Allanite Occurrences

Franklin: allanite, thorite listed with other minerals from mines in area including Mine Hill, Franklin Furnace, Sterling Hill, Ogdensburg zinc and iron mines: 846; allanite in iron ores and as a rare accessory mineral in granitic pegmatite: 890; small allanite crystals embedded in gneiss: 691.

Buckwheat mine: allanite from pegmatite on mine dump: 1043; allanite found with zinc and fluorescent minerals on dump: 1041.

Franklin Furnace: allanite and thorite as accessory minerals in pegmatite in gneisses: 969; allanite, thorite: 997; allanite in pegmatite masses in abandoned iron mines: 1105.

Hill or Franklin mine at Franklin Furnace, Hardyston Township: allanite and magnetite in pegmatite interbanded with gneiss associated with the ore: 660.

Mine Hill: allanite, zircon, graphite, fluorite, and scapolite reported here in acid pegmatite by Spencer but not found in present study: 922.

Old Iron Mine: allanite abundant in feldspar of granite dikes: 789, 808.

Trotter mine at N end of Mine Hill: allanite, so abundant that granite containing it is called an allanite granite: 700; allanite in green microcline: 890; allanite in rather large amount in granite dike that pierces orebody: 1105; allanite abundant in granite dike and pegmatites in iron mines: 810; allanite with zinc ores in granite dike; crystal similar to that found by Dana at Moriah, New York: 734; allanite, thorite in granite: 808; allanite in coarse granite; thorite, rare and in small grains, in granite: 969.

Ogden mine : allanite: 691, 997.

NEW JERSEY (contd.)

Sussex County (contd.)

Allanite Occurrences

Ogdensburg: allanite, yttrocerite: 997.

Mud Mine: allanite with pyroxene: 810; allanite: 808.

Pochuck Mountain: allanite as an accessory mineral, sometimes in large crystals, in a granite, with a composition intermediate between the Byram and Losee gneisses: 969.

Vernon: good crystals of allanite in greenish muscovite: 1062.

Wykertown: allanite is the least abundant mineral and occurs in crystals too small to permit chemical analysis: 866; spectrographic examination of the allanite showed it contained minor amounts of Th and the optical properties and X-ray diffraction pattern helped to establish its identity: 866; natrolite, andradite, allanite, and a little quartz occur as a satellitic hydrothermal deposit in heavily weathered portion of a dike of porphyritic nepheline syenite in a small area 100 feet or so wide at the western end of the dike: 866.

Wykertown, 1 mi. SE of: dark brown allanite in porphyritic syenite dike: 1056.

Autunite Occurrences

Edison: allanite, autunite: 846.

Radioactive Magnetite

Franklin Furnace: age determination tests on one specimen of magnetite gave the following results: No. 1019 gave 0.030 activity by radon-thoron count and an age of 640 m.y., and 0.037 activity by direct alpha count and an age of 530 m.y., and 0.66 He: 785.

Ogden mines at Edison, 3 mi. S of Franklin: radioactivity of magnetite orebody in gneiss with pegmatitic hanging wall, rich in sulfides, and radioactive, averaged 0.10 mr/hr.; radioactivity of sample of wall rock, 0.007% eU and 0.005% U, and of

NEW JERSEY (contd.)

Radioactive Magnetite (contd.)

Ogden mines at Edison, 3 mi. S of Franklin:

tailings from S of mill, 0.005% eU and 0.002% U: 843.

Radioactive Minerals

Franklin: helium and radioactivity data for: 22 minerals, not usually considered as belonging to the radioactive group, ranged from 0.08 to 65.5 x 10^{-5}cc. He./g. and from less than 0.007 to 4.63 alpha/mg./hr.: 798.

Sterling Hill: helium and radioactivity data for: 9 minerals, not usually considered as belonging to the radioactive group, ranged from 0.13 to 4.19 x 10^{-5}cc. He./g. and from 0.005 to 0.37 alpha/mg./hr.: 798.

Radioactive Occurrences

General: no radioactivity reported in Cascade and Allis mine and Sulfur Hill mine: 843.

Franklin: complex group of radioactive rocks and minerals: 45; radioactivity in alpha/mg./hr. of the ore minerals in the complex groups of Franklin and Sterling Hill taken together ranges from 0.0 - 7.0 for 91 specimens analyzed; none of these minerals belongs to the group of minerals usually considered to be radioactive: 45; radioactivity in alpha/mg./hr. of rocks in complex group ranges from 0.2 - 7.1 for 29 specimens analyzed: 45.

Sterling Hill: complex group of radioactive rocks and minerals: 45; radioactivity in alpha /mg./hr. of rocks in complex group ranges from 0.57 - 44.0 for 22 specimens analyzed: 45.

Radioactive Rocks

Andover mines, 1.75 mi. NNE of Andover: radioactivity of hematite-magnetite deposit in gneiss, in which part of hanging wall gneiss is radioactive but ore zone is not, ranges from 0.07 to a maximum of 0.1 mr/hr.; radioactivity of sample of quartzite and black shaly rock, 0.005% eU and 0.003% U: 843.

NEW JERSEY (contd.)

Sussex County (contd.)

Radioactive Rocks

Colesville, 2 mi. NW of: radiometric examination in field of Shawangunk conglomerate(?), ferruginous sandstone float no radioactivity found; no analysis for U or P_2O_5: 935.

Franklin: helium and radioactivity data for:
1. trap dike, 11 x 10^{-5}cc. He/g.:798;
2. Pochuck gneiss, 1.71 x 10^{-5}cc. He/g., 0.46 alphas/mg./hr.:798;

radioactivity in alphas/mg./hr. of individual rocks in the Franklin complex group was found to be: 0.2 - 2.2 for trap dike, one specimen analyzed; 1.53 for white limestone, 11 specimens analyzed; 1.1 for graphitic white limestone, one specimen analyzed; 0.72 for blue limestone, three specimens analyzed; 1.9 for blue limestone with shale, one specimen analyzed; 0.4 for blue limestone with chert, one specimen analyzed; 7.1 for Boni pegmatite, one specimen analyzed; 1.2 for mica amphibolites, four specimens analyzed; 0.58 for Pochuck gneiss, six specimens analyzed: 45.

Franklin and Sterling Hill: helium and radioactivity data for: basic pegmatite (Precambrian): felsic portion, activity 5.89 alphas/mg./hr.: 803; mafic portion, activity 10.5 alphas/mg./hr.: 803.

Franklin and Sterling Hill: helium and radioactivity data for: camptonite dike (Post-Ordovician), 11.0 x 10^{-5}cc. He/g. and activity 2.1 and 2.4 or an average of 2.25 alpha / mg/hr.: 803.

Franklin and Sterling Hill: helium and radioactivity data for: Franklin limestone (Algonkian), activity 1.08 alphas/mg./hr.: 803.

Franklin and Sterling Hill: helium and radioactivity data for: green pegmatite (Late Precambrian): activity 0.1 and 0.18 alphas/mg./hr., amazonite, 0.08 x 10^{-5}cc.

NEW JERSEY (contd.)

Sussex County (contd.)

Radioactive Rocks

Franklin and Sterling Hill: helium and radioactivity data for: green pegmatite (Late Precambrian): He/g. and activity 0.20 alphas/mg./hr.: 803; quartz activity 0.07 alphas/mg./hr.; 803.

Franklin and Sterling Hill: helium and radioactivity data for: grey pegmatite (Late Precambrian): activity 0.31 alphas/mg./hr.; feldspar, 1.37 x 10^{-5}cc. He/g., and activity 0.28 and 0.29 alpha /mg./hr.: 803.

Franklin and Sterling Hill: helium and radioactivity data for: minerals (largely Late Precambrian), 0.08 to 66.4 x 10^{-5}cc. He/g. and activity 0.00 to 7.2 alphas/mg./hr.: 803.

Franklin and Sterling Hill: helium and radioactivity data for: Pochuck gneiss (Precambrian) (two samples) 1.67 x 10^{-5}cc. He/g. and activity 0.50 and 0.43 or an average of 0.46 alphas/mg/hn; activity 0.97 alphas/mg/hr.: 803.

Newton, 8 mi. NW of: radiometric examination in field of Shawangunk conglomerate(?), ferruginous sandstone float, no radioactivity found; no analysis for U or P_2O_5: 935.

Sterling Hill: helium and radioactivity data for: Pochuck gneiss, 1.71 x 10^{-5}cc. He/g., 0.46 alphas/mg./hr.: 798; radioactivity in alphas/mg./hr. of individual rocks in the Sterling Hill complex group was found to be: 0.57 for white limestone, nine specimens analyzed; 0.7 for quartzite, one specimen analyzed; 0.60 for blue limestone, four specimens analyzed; 1.0 for pegmatites, four specimens analyzed; 7.5 for Boni pegmatite, one specimen analyzed with 5.9 for the felsic portion and 10.5 for the mafic portion; 0.7 - 44.0 for

NEW JERSEY (contd.)

Sussex County (contd.)
Radioactive Rocks
Sterling Hill:
pyroxenites, two specimens analyzed; 1.2 for Pochuck gneiss, one specimen analyzed: 45.
Thorite Occurrences
Franklin: allanite, thorite listed with other minerals from mines in area including Mine Hill, Franklin Furnace, Sterling Hill, Ogdensburg zinc and iron mines: 846; thorite as a rare accessory mineral in granitic pegmatite: 890.
Franklin Furnace: allanite, thorite: 997; allanite and thorite as accessory minerals in pegmatite in gneisses: 969.
Trotter Mine: allanite, thorite in granite: 808; allanite in coarse granite; thorite, rare and in small grains, in granite: 969.
Thorium Occurrences
General: allanite: 249.
Andover Mining District
Sulphur Hill mine: allanite as a minor accessory in the biotite-quartz-feldspar gneiss of the skarn deposit: 961.
Beemerville: rare earths, including cerium and thorium, in aegirite of nephelite syenite and nephelite porphyry: 636.
Byram township
Losee Pond, NE of: allanite in fine grained biotite phase of "Oxford type" of Byram gneiss: 969.
Sand Pond: allanite in bronzy gneiss with little hornblende, a phase of Byram gneiss: 969.
Edison: allanite, autunite: 846.
Franklin: allanite, thorite listed with other minerals from mines in area including Mine Hill, Franklin Furnace, Sterling Hill, Ogdensburg zinc and iron mines: 846; allanite in iron ores and as a rare accessory mineral in granitic pegmatite: 890; small allanite crystals

NEW JERSEY (contd.)

Sussex County (contd.)
Thorium Occurrences
Franklin:
embedded in gneiss: 691; thorite as a rare accessory mineral in granitic pegmatite: 890; yttrocerite discovered by Col. Gibbs: 924; yttrocerite discovered there by Gibbs in 1825, first known reported occurrence outside of Scandinavian area of Europe: 670.
Buckwheat mine: allanite found with zinc and fluorescent minerals on dump: 1041; allanite from pegmatite on mine dump: 1043.
Franklin Furnace: allanite, thorite: 997; allanite and thorite as accessory minerals in pegmatite in gneisses: 969; allanite in pegmatite masses in abandoned iron mines: 1105.
Hill or Franklin mine at Franklin Furnace, Hardyston Township: allanite and magnetite in pegmatite interbanded with gneiss associated with the ore: 660.
Mine Hill: allanite, zircon, graphite, fluorite, and scapolite reported here in acid pegmatite by Spencer but not found in present study: 922.
Old Iron Mine: allanite abundant in feldspar of granite dikes: 789; allanite abundant in feldspar of granite dikes: 808.
Trotter mine at N end of Mine Hill: allanite, so abundant that granite containing it is called an allanite granite: 700; allanite in green microcline: 890; allanite in rather large amount in granite dike that pierces orebody: 1105; allanite abundant in granite dike and pegmatites in iron mines: 810; allanite with zinc ores in granite dike; crystal similar to that found by Dana at Moriah, New York: 734; allanite, thorite in granite: 808;

NEW JERSEY (contd.)

Sussex County (contd.)
Thorium Occurrences
Franklin
Trotter mine at N end of Mine Hill: allanite in coarse granite; thorite, rare and in small grains, in granite: 969.
Ogden mine: allanite: 691, 997.
Ogdensburg: allanite, yttrocerite: 997.
Mud Mine: allanite with pyroxene: 810; allanite: 808.
Pochuck Mountain: allanite as an accessory mineral sometimes in large crystals, in a granite, with a composition intermediate between the Byram and Losee gneisses: 969.
Vernon: good crystals of allanite in greenish muscovite: 1062; yttrocerite: 846.
Wykertown: allanite is the least abundant mineral and occurs in crystals too small to permit chemical analysis: 866; spectrographic examination of the allanite showed it contained minor amounts of Th and the optical properties and X-ray diffraction pattern helped to establish its identity: 866; natrolite, andradite, allanite, and a little quartz occur as a satellitic hydrothermal deposit in heavily weathered portion of a dike of porphyritic nepheline syenite in a small area 100 feet or so wide at the western end of the dike: 866.
Wykertown, 1 mi. SE of: dark brown allanite in porphyritic syenite dike: 1056.
Uranium Occurrences
Andover mines, 1.75 mi. NNE of Andover: radioactivity of hematite-magnetite deposit in gneiss, in which part of hanging wall gneiss is radioactive but ore zone is not , ranges from 0.07 to a maximum of 0.1 mr/hr; radioactivity of sample of

NEW JERSEY (contd.)

Sussex County (contd.)
Uranium Occurrences
Andover mines, 1.75 mi. NNE of Andover:
quartzite and black shaly rock, 0.005% eU and 0.003% U: 843.
Edison: allanite, autunite: 846.
Franklin: allanite, thorite listed with other minerals from mines in area including Mine Hill, Franklin Furnace, Sterling Hill, Ogdensburg zinc and iron mines: 846; thorite as a rare accessory mineral in granitic pegmatite: 890.
Franklin Furnace: allanite, thorite: 997; allanite and thorite as accessory minerals in pegmatite in gneisses: 969.
Trotter Mine: allanite, thorite in granite: 808; allanite in coarse granite; thorite, rare and in small grains, in granite: 969.
Ogden mines at Edison, 3 mi. S of Franklin: radioactivity of magnetite orebody in gneiss with pegmatitic, hanging wall, rich in sulfides, and radioactive, averaged 0.10 mr/hr; radioactivity of sample of wall rock, 0.007% eU and 0.005% U, and of tailings from S of mill, 0.005% eU and 0.002% U: 843.
Yttrocerite Occurrences
Franklin: yttrocerite discovered there by Gibbs in 1825, first known reported occurrence outside of Scandinavian area of Europe: 670; yttrocerite discovered by Col. Gibbs: 924.
Ogdensburg: allanite, yttrocerite: 997.
Vernon: yttrocerite: 846.

Thorianite Occurrences
See under individual county names and under Index III, Thorianite Occurrences-New Jersey: 1071, 1072.

NEW JERSEY (contd.)

Thorite Occurrences
See under individual county names and under Index III, Thorite Occurrences-New Jersey: 808, 843, 846, 890, 969, 997.

Thorium Occurrences
See under individual county names and under Index III, Thorium Occurrences-New Jersey: 249, 636, 660, 670, 691, 700, 734, 745, 786, 789, 800, 808, 810, 841, 843, 844, 846, 866, 876, 890, 922, 924, 961, 969, 994, 997, 1041, 1043, 1056, 1062, 1071, 1072, 1090, 1103, 1105, 1113.

Bibliography: 767.

Torbernite Occurrences
See under individual county names and under Index III, Torbernite Occurrences-New Jersey: 509, 973, 1005, 1072, 1073, 1090.

Union County
Radioactive Rocks
First Watchung Mountain opposite and 1 mi. E of Summit: First Watchung trap, radioactivity 0.16 ≠ - 0.01 x 10^{-12}g. Ra/g. rock: 745.
Murray Hill: Second Watchung basalt, 25 ft. below surface in a quarry, activity 0.75 x 10^{-5}cc. He/g.: 786.
Murray Hill, SW of Summit, from old quarry on top of Second Watchung Mountain: Second Watchung basalt with fine diabasic texture, radioactivity 0.18 ≠ - 0.01 x 10^{-12}g. Ra/g. rock: 745.
Scotch Plains: First Watchung basalt (two specimens): first, 35 ft. below surface in quarry, activity 0.59 x 10^{-5}cc. He/g.; second, 70 ft. below surface, activity 0.45 x 10^{-5}cc. He/g.: 786.
Summit: First Watchung basalt, 30-50 ft. below surface in quarry, activity 0.61 x 10^{-5}cc. He/g.: 786.

NEW JERSEY (contd.)

Uraninite Occurrences
See under individual county names and under Index III, Uraninite Occurrences-New Jersey: 1005, 1090, 1103.

Uranite Occurrences
See under individual county names and under Index III, Uranite Occurrences-New Jersey: 660, 691, 708, 846, 997.

Uranium Exploration
See under individual county names and under Index III, Uranium Exploration-New Jersey: 1086, 1090, 1101.

Uranium Occurrences
See under individual county names and under Index III, Uranium Occurrences-New Jersey: 27, 62, 426, 509, 660, 688, 691, 708, 745, 767, 800, 841, 843, 846, 883, 890, 969, 973, 994, 995, 997, 1005, 1069, 1071, 1072, 1073, 1090, 1093, 1102, 1103, 1113.

Bibliography of U.S.G.S. Reports: 572, 1004.

Uranochre Occurrences
See under individual county names and under Index III, Uranochre Occurrences-New Jersey: 660, 708.

Uranophane Occurrences
See under individual county names and under Index III, Uranophane Occurrences-New Jersey: 1073.

Uranothorite Occurrences
See under individual county names and under Index III, Uranothorite Occurrences-New Jersey: 1005.

NEW JERSEY (contd.)

Warren County

Allanite Occurrences

Washington mine, Oxford furnace: allanite, rutile, sphene, zircon, usually present in pegmatite masses cutting orebody of iron mines: 876.

Limestone, Uranium-bearing

General: pitchblende as replacement deposit in Franklin limestone: 841.

Monazite Occurrences

Poronowicz farm on NW side of village of Oxford Furnace: radioactivity of quartz-feldspar pegmatite with a little magnetite and monazite, 0.02 mr/hr maximum; radioactivity of pegmatite sample from an outcrop on E side of road behind barn and containing magnetite and monazite, 0.040% eU and 0.008% U: 843.

Pitchblende Occurrences

General: pitchblende as replacement deposit in Franklin limestone: 841.

Radioactive Hematite

Marble Mountain: a rather continuous radioactivity anomaly occurs for about 1500 ft. on the top, 1 mi. N of Phillipsburg; this anomaly is more intense than those on Chestnut Hill in Pennsylvania but measurements at large outcrops and relative paucity of megascopic radioactive minerals indicate that the anomalies are from large masses of weakly radioactive rock rather than small high-grade concentrations whose radioactivity is reduced by soil or rock cover; the radioactive rocks here are made up of parts of the Pickering gneiss and Franklin limestone but the radioactivity within the area, which is about 1500 ft. long and 500 ft. wide, varies as much as tenfold; the most radioactive rock is the aphanitic rhyolite-like-quartz

NEW JERSEY (contd.)

Warren County

Radioactive Hematite

Marble Mountain: sericite schist, of which samples contain as much as 0.044% eU and 0.005% U, while the hematitic quartzite is the least radioactive; the schist contains a Th-bearing phosphate mineral resembling florencite in X-ray powder pattern but having Th as its major element; the mineral is pale chocolate in color usually occurring as irregular masses up to 0.5 in. long and 0.25 in. thick; data are insufficient to determine if mineral is a mixture of thorite and florencite or a florencite in which Th has replaced Ce; the only other radioactive substance occurred in yellow to reddish brown smeared blebs about 1/16 in. wide and $\frac{1}{4}$ in. long, identified as hematite by X-ray powder pattern: 843.

Radioactive Magnetite

Mitchell mine, 17 mi. NE of Phillipsburg: radioactivity of magnetite-bearing pegmatite, judged from material on dump, 0.04 mr/hr; radioactivity of a sample of pegmatitic magnetite ore, 0.005% eU and of magnetite-bearing pegmatite from pile of rocks SE of mine shaft, 0.001% eU: 843.

Oxford Furnace: no radioactivity shown at this magnetite orebody 0.5 mi. S of village of Oxford Furnace, but sample of magnetite ore from dump showed 0.001% eU; radioactivity of slag dump in the village was 0.05 mr/hr and of sample of slag from old furnace, 0.004% eU and 0.002% U: 843.

Radioactive Occurrences

General: no radioactivity reported in Ahles mine, Beatyestown mine, Carpentersville mine, Raub mine, Rock Products quarry, and Warren Furnace: 843.

NEW JERSEY (contd.)

Warren County (contd.)

Radioactive Occurrences

Belvidere group, southern part, 1 mi. N of Oxford Furnace: radioactivity of part composed of Queen, Riddle, and Little (Fellows) mines, made up of limonite and magnetite rock on dump but originally deposited in Franklin limestone, 0.16 mr/hr. maximum; radioactivity of samples from Fellows mine: yellow white clay, weathered dump material, 0.002% eU and U, black topsoil 0.013% eU, 0.005% U, and 0.018% ThO_2, ash of leaves and twigs of silver maple trees 0.7 ppm. U and 0.002% ThO_2, ash of leaves and twigs from cat brier vine 0.8 ppm. U and 0.002% Th, and ash of leaves and twigs of sarsaparilla plants 1.2 ppm. U and 0.002% Th; much of dump material has weathered to clayey soil of which an area near Little mine is radioactive, the upper few inches of topsoil being most radioactive: 843.

Edison quarry, 13 mi. NE of Phillipsburg: maximum radioactivity of silicated Franklin limestone, very rarely containing uraninite, 0.2 mr/hr; no radioactive minerals found at outcrops and present in only a few boulders on dump: 843.

Pequest furnace, 16 mi. NE of Phillipsburg: no radioactivity reported for slag dump of old furnace but slag sample gave 0.004% eU and 0.002% U: 843.

Poronowicz farm on NW side of village of Oxford Furnace: radioactivity of quartz-feldspar pegmatite with a little magnetite and monazite, 0.02 mr/hr maximum; radioactivity of pegmatite sample from an outcrop on E side of road behind barn

NEW JERSEY (contd.)

Warren County (contd.)

Radioactive Occurrences

Poronowicz farm on NW side of village of Oxford Furnace: and containing magnetite and monazite, 0.040% eU and 0.008% U: 843.

Washington mine, 2 mi. S of Oxford Furnace: no radioactivity reported in magnetite orebody but two samples of tailings gave 0.003% and 0.001% eU: 843.

Thorianite Occurrences

Royal Green Marble Quarry (formerly, Rock Products Co. quarry) on Delaware River 2 mi. N of toll bridge at Phillipsburg: thorianite in serpentine: 1071, 1072.

Thorite Occurrences

Marble Mountain: a rather continuous radioactivity anomaly occurs for about 1500 ft. on the top, 1 mi. N of Phillipsburg; this anomaly is more intense than those on Chestnut Hill in Pennsylvania but measurements at large outcrops and relative paucity of megascopic radioactive minerals indicate that the anomalies are from large masses of weakly radioactive rock rather than small high-grade concentrations whose radioactivity is reduced by soil or rock cover; the radioactive rocks here are made up of parts of the Pickering gneiss and Franklin limestone but the radioactivity within the area, which is about 1500 ft. long and 500 ft. wide, varies as much as tenfold; the most radioactive rock is the aphanitic rhyolite-like-quartz sericite schist, of which samples contain as much as 0.044% eU and 0.005% U, while the hematitic quartzite is the least radioactive; the schist contains a Th-bearing phosphate mineral

NEW JERSEY (contd.)

Warren County (contd.)

Thorite Occurrences

Marble Mountain: resembling florencite in X-ray powder pattern but having Th as its major element; the mineral is pale chocolate in color usually occurring as irregular masses up to 0.5 in. long and 0.25 in. thick; data are insufficient to determine if mineral is a mixture of thorite and florencite or a florencite in which Th has replaced Ce; the only other radioactive substance occurred in yellow to reddish brown smeared blebs about 1/16 in. wide and $\frac{1}{4}$ in. long, identified as hematite by X-ray powder pattern: 843.

Thorium Occurrences

General; pitchblende as replacement deposit in Franklin limestone: 841.

Belvidere group, southern part, 1 mi. N of Oxford Furnace: radioactivity of part composed of Queen, Riddle, and Little (Fellows) mines, made up of limonite and magnetite rock on dump but originally deposited in Franklin limestone, 0.16 mr/hr. maximum; radioactivity of samples from Fellows mine: yellow white clay, weathered dump material, 0.002% eU and U, black topsoil 0.013% eU, 0.005% U, and 0.018% ThO_2, ash of leaves and twigs of silver maple trees 0.7 ppm. U and 0.002% ThO_2, ash of leaves and twigs from cat brier vine 0.8 ppm. U and 0.002% Th, and ash of leaves and twigs of sarsaparilla plants 1.2 ppm. U and 0.002% Th; much of dump material has weathered to clayey soil of which an area near Little mine is radioactive, the upper few inches of topsoil being most radioactive: 843.

Edison quarry 13 mi. NE of Phillipsburg: maximum radioactivity of silicated Franklin limestone, very rarely containing uraninite,

NEW JERSEY (contd.)

Warren County (contd.)

Thorium Occurrences

Edison quarry 13 mi. NE of Phillipsburg: 0.2 mr/hr; no radioactive minerals found at outcrops and present in only a few boulders on dump: 843.

Marble Mountain: a rather continuous radioactivity anomaly occurs for about 1500 ft. on the top, 1 mi. N of Phillipsburg; this anomaly is more intense than those on Chestnut Hill in Pennsylvania but measurements at large outcrops and relative paucity of megascopic radioactive minerals indicate that the anomalies are from large masses of weakly radioactive rock rather than small high-grade concentrations whose radioactivity is reduced by soil or rock cover; the radioactive rocks here are made up of parts of the Pickering gneiss and Franklin limestone but the radioactivity within the area, which is about 1500 ft. long and 500 ft. wide, varies as much as tenfold; the most radioactive rock is the aphanitic, rhyolite-like-quartz sericite schist, of which samples contain as much as 0.044% eU and 0.005% U, while the hematitic quartzite is the least radioactive; the schist contains a Th-bearing phosphate mineral resembling florencite in X-ray powder pattern but having Th as its major element; the mineral is pale chocolate in color usually occurring as irregular masses up to 0.5 in. long and 0.25 in. thick; data are insufficient to determine if mineral is a mixture of thorite and florencite or a florencite in which Th has replaced Ce; the only other radioactive substance occurred in yellow to reddish brown smeared blebs about 1/16 in. wide and $\frac{1}{4}$ in long, identified as hematite by X-ray powder pattern: 843.

NEW JERSEY (contd.)

Warren County (contd.)

Thorium Occurrences

Marble Mountain, 2 mi. N of Phillipsburg: poorly exposed and perhaps discontinuous radioactive zone, 1500 ft. long, containing hematite and florencite in which Th substitutes for Ce, in sericite-quartz schist: 994.

Poronowicz farm on NW side of village of Oxford Furnace: radioactivity of quartz-feldspar pegmatite with a little magnetite and monazite, 0.02 mr/hr maximum; radioactivity of pegmatite sample from an outcrop on E side of road behind barn and containing magnetite and monazite, 0.040% eU and 0.008% U: 843.

Royal Green Marble Quarry (formerly, Rock Products Company quarry) on Delaware River 2 mi. N of toll bridge at Phillipsburg: thorianite in serpentine: 1071, 1072.

Washington mine, Oxford furnace: allanite, rutile, sphene, zircon, usually present in pegmatite masses cutting orebody of iron mines: 876.

Uraninite Occurrences

Edison quarry, 13 mi. NE of Phillipsburg: maximum radioactivity of silicated Franklin limestone, very rarely containing uraninite, 0.2 mr/hr; no radioactive minerals found at outcrops and present in only a few boulders on dump: 843.

Uranium Occurrences

General: pitchblende as replacement deposit in Franklin limestone: 841.

Analysis of laurel leaves gave 0.5 ppm. U in ash and 0.016% Th and leaves and twigs of maple trees gave 0.8 ppm. U in ash and 0.002% Th in ash: 843.

Belvidere group, southern part, 1 mi. N of Oxford Furnace: radioactivity of part composed of Queen, Riddle, and Little (Fellows) mines, made up of limonite and

NEW JERSEY (contd.)

Warren County (contd.)

Uranium Occurrences

Belvidere group, southern part, 1 mi. N of Oxford Furnace: magnetite rock on dump but originally deposited in Franklin limestone, 0.16 mr/hr. maximum; radioactivity of samples from Fellows mine: yellow white clay, weathered dump material, 0.002% eU and U, black topsoil 0.13% eU, 0.005% U, and 0.018% ThO_2, ash of leaves and twigs of silver maple trees 0.7 ppm. U and 0.002% ThO_2, ash leaves and twigs from cat brier vine 0.8 ppm. U and 0.002% Th, and ash of leaves and twigs of sarsaparilla plants 1.2 ppm. U and 0.002% Th; much of dump material has weathered to clayey soil of which an area near Little mine is radioactive, the upper few inches of topsoil being most radioactive: 843.

Edison quarry 13 mi. NE of Phillipsburg: maximum radioactivity of silicated Franklin limestone, very rarely containing uraninite, 0.2 mr/hr; no radioactive minerals found at outcrops and present in only a few boulders on dump: 843.

Franklin limestone: primary uranium minerals reported in pyrometasomatic deposits by A. P. Butler of U.S.G.S.; deposits are of interest because they indicate the presence of primary uranium minerals in the Appalachian region: 1069.

Marble Mountain: a rather continuous radioactivity anomaly occurs for about 1500 ft. on the top, 1 mi. N of Phillipsburg; this anomaly is more intense than those on Chestnut Hill in Pennsylvania but measurements at large outcrops and relative paucity of megascopic radioactive minerals indicate that the anomalies are from large masses of weakly radioactive rock rather than small high-grade concentrations

NEW JERSEY (contd.)

Warren County (contd.)
Uranium Occurrences
Marble Mountain:
whose radioactivity is reduced by soil or rock cover; the radioactive rocks here are made up of parts of the Pickering gneiss and Franklin limestone but the radioactivity within the area, which is about 1500 ft. long and 500 ft. wide, varies as much as tenfold; the most radioactive rock is the aphanitic, rhyolite-like-quartz sericite schist, of which samples contain as much as 0.044% eU and 0.005% U, while the hematitic quartzite is the least radioactive; the schist contains a Th-bearing phosphate mineral resembling florencite in X-ray powder pattern but having Th as its major element; the mineral is pale chocolate in color usually occurring as irregular masses up to 0.5 in. long and 0.25 in. thick; data are insufficient to determine if mineral is a mixture of thorite and florencite or a florencite in which Th has replaced Ce; the only other radioactive substance occurred in yellow to reddish brown smeared blebs about 1/16 in. wide and ¼ in. long, identified as hematite by X-ray powder pattern: 843.
Origin: mineralogy and close spatial relationship of radioactive rocks in both the Chestnut Hill and Marble Mountain occurrences suggest that pegmatite is the source of the radioactive elements, which may have been deposited from solution after migration along contact between Franklin limestone and Pickering gneiss or through other sheared and faulted zones in the Precambrian rocks, but structure and probably lithology are the controlling features of their concentration

NEW JERSEY (contd.)

Warren County (contd.)
Uranium Occurrences
Origin:
since the anomalies occur along the strike of these features for a distance of more than two miles: 843.
Oxford Furnace: no radioactivity shown at this magnetite orebody 0.5 mi. S of village of Oxford Furnace, but sample of magnetite ore from dump showed 0.001% eU; radioactivity of slag dump in the village was 0.05 mr/hr. and of sample of slag from old furnace, 0.004% eU and 0.002% U: 843.
Pequest furnace, 16 mi. NE of Phillipsburg: no radioactivity reported for slag dump of old furnace but slag sample gave 0.004% eU and 0.002% U: 843.
Poronowicz farm on NW side of village of Oxford Furnace: radioactivity of quartz-feldspar pegmatite with a little magnetite and monazite, 0.02 mr/hr. maximum; radioactivity of pegmatite sample from an outcrop on E side of road behind barn and containing magnetite and monazite, 0.040% eU and 0.008% U: 843.
Royal Green Marble Quarry (formerly, Rock Products Co. quarry) on Delaware River 2 mi. N of toll bridge at Phillipsburg: thorianite in serpentine: 1071, 1072.
Limestone, Uranium-bearing
General: pitchblende as replacement deposit in Franklin limestone: 841.

Water, Uranium-bearing
See under individual county names and under Index III, Water, Uranium-bearing-New Jersey: 973.

NEW JERSEY (contd.)

Xenotime Occurrences
See under individual county names and under Index III, Xenotime Occurrences-New Jersey: 1113.

Yttrocerite Occurrences
See under individual county names and under Index III, Yttrocerite Occurrences-New Jersey: 670, 846, 924, 997.

NEW YORK

General
Allanite Occurrences
General: allanite, columbite, gummite, monazite, thorite, torbernite, uraconite, uraninite, and xenotime: 1098; allanite deposits are known in Colorado, New Jersey, New York, North Carolina, Pennsylvania, Texas, Virginia, and Wyoming; while most of the deposits are of mineralogical interest only, commercial shipments have been made from Wyoming, Virginia, and possibly North Carolina: 1105.
Adirondack Mountains: allanite in magnetite deposits: 1098.
Autunite Occurrences
Southeast Part: pegmatites contain, among others, the following minerals: autunite, beryl, columbite, cyrtolite, monazite, uraconite, uraninite, uranotile, xenotime, zircon; pegmatites range in thickness from less than 1 in. to over 200 ft. as in the Bedford quarries: 749.
Black Shales, Uranium-bearing
General: uranium in black shales: 426.
Carnotite Occurrences
General: the red bed formations of the Catskill region are similar in physical characteristics and mode of deposition to uranium-bearing red beds on the Colorado Plateau,

NEW YORK (contd.)

General (contd.)
Carnotite Occurrences
General:
suggesting it might be worth examining them for secondary uranium minerals like carnotite; occurrences of carnotite have been reported recently but few reports have been verified and no economic orebodies have been proved: 1107.
Cyrtolite Occurrences
Southeast Part: pegmatites contain, among others, the following minerals: autunite, beryl, columbite, cyrtolite, monazite, uraconite, uraninite, uranotile, xenotime, zircon; pegmatites range in thickness from less than 1 in. to over 200 ft. as in the Bedford quarries: 749.
Geophysical Exploration(Airborne)
General: airborne radiometric survey for uranium ore in northern New Jersey and adjacent southeastern New York area by Safair Flying Service of Teterboro, New Jersey; ground reconnaissance combined with air operations: 1086.
Geophysical Exploration (Ground)
Adirondack Mountains: radioactivity of Precambrian rocks studied with car-mounted Geiger-Mueller equipment; supplementary studies were made on foot of areas showing abnormally high (more than 0.003% eU) radioactivity; at contact of igneous and metamorphic rocks, average radioactivity was estimated as 0.003-0.004% eU, while pegmatites contained as much as 0.043% U and 0.63% Th; iron slag containing 0.030% eU, 0.007% U, and 0.11% ThO_2 was found at Moriah Center and radioactivity of several other abnormally radioactive areas was due, in part, to the U and Th content of iron minerals: 875.

NEW YORK (contd.)

General (contd.)
Geophysical Exploration (Ground)
Hudson Valley: radioactivity of Paleozoic shale-slate belt studied with car-mounted Geiger-Mueller equipment; average radioactivity of the most strongly radioactive rocks found to be 0.003% eU; samples taken were analyzed chemically: 875.
Gummite Occurrences
General: allanite, columbite, gummite, monazite, thorite, torbernite, uraconite, uraninite, and xenotime: 1098.
Iron Deposits, Thorium-bearing
General: several interesting occurrences in Precambrian granitic gneiss of New Jersey and New York are associated with magnetite-rich rocks; two of particular interest were: uraninite along contact of a footwall gneiss and magnetite ore, but uranium is known only in pockets one to two ft. in diameter scattered at random along zones parallel to gneissic foliation and its distribution is unrelated to folds, faults, and shears in the gneiss indicating that the association with magnetite and ferromagnesian gneiss is a better ore guide in this occurrence than the structure: 1005; several interesting occurrences in Precambrian granitic gneiss of New Jersey and New York are associated with magnetite-rich rocks; two of particular interest were: uranothorite in an extensive footwall zone of a magnetite orebody, the uraniferous zone being stained red by hematite as were the borders of associated radioactive fractures; such hematite staining is a prominent feature of many large uranium vein deposits, especially in the Precambrian shield area of western Canada: 1005.

NEW YORK (contd.)

General (contd.)
Iron Deposits, Thorium-bearing
Adirondack Mountains: radioactivity of Precambrian rocks studied with car-mounted Geiger-Mueller equipment; supplementary studies were made on foot of areas showing abnormally high (more than 0.003% eU) radioactivity; at contact of igneous and metamorphic rocks, average radioactivity was estimated as 0.003-0.004% eU, while pegmatites contained as much as 0.043% U and 0.63% Th; iron slag containing 0.030% eU, 0.007% U, and 0.11% ThO_2 was found at Moriah Center and radioactivity of several other abnormally radioactive areas was due, in part, to the U and Th content of iron minerals: 875; magnetite deposits here and in the crystalline belt in New York contain small concentrations of uraninite: 1103.
Lake Champlain Iron District: uranothorite, a thorite rich in uranium: 1034.
Iron Deposits, Uranium-bearing
General: several interesting uranium occurrences in Precambrian granitic gneiss of New Jersey and New York are associated with magnetite-rich rocks; three of particular interest were: uraninite along contact of a footwall gneiss and magnetite ore but uranium in known only in pockets one to two ft. in diameter scattered at random along zones parallel to gneissic foliation and its distribution is unrelated to folds, faults, and shears in the gneiss indicating that the association with magnetite and ferromagnesian gneiss is a better ore guide in this occurrence than the structure: 1005; several interesting uranium occurrences in Precambrian granitic gneiss of New Jersey and New York are associated with magnetite-rich rocks; three

NEW YORK (contd.)

General (contd.)

Iron Deposits, Uranium-bearing

General:

of particular interest were: uranothorite in an extensive footwall zone of a magnetite orebody, the uraniferous zone being stained red by hematite as were the borders of associated radioactive fractures; such hematite staining is a prominent feature of many large uranium vein deposits, especially in the Precambrian shield area of western Canada: 1005; several interesting uranium occurrences in Precambrian granitic gneiss of New Jersey and New York are associated with magnetite-rich rocks; three of particular interest were: uranium confined to chlorite-hornblende-magnetite rich layers in tightly folded and drag-folded schistose gneiss bordering the magnetite ore; uranium concentrations are localized along the axial parts of these folds forming pencil-like shoots several feet across, of good grade, and parallel to the regional plunge: 1005.

Adirondack Mountains: radioactivity of Precambrian rocks studied with car-mounted Geiger-Mueller equipment; supplementary studies were made on foot of areas showing abnormally high (more than 0.003% eU) radioactivity; at contact of igneous and metamorphic rocks, average radioactivity was estimated as 0.003%-0.004% eU, while pegmatites contained as much as 0.043% U and 0.63% Th; iron slag containing 0.030% eU; 0.007% U, and 0.11% ThO_2 was found at Moriah Center and radioactivity of several other abnormally radioactive areas was due, in part, to the U and Th content of iron minerals: 875;

NEW YORK (contd.)

General (contd.)

Iron Deposits, Uranium-bearing

Adirondack Mountains: magnetite deposits here and in the crystalline belt in New York contain small concentrations of uraninite: 1103.

Iron mines: primary uranium minerals: 883.

Lake Champlain Iron District: uranothorite, a thorite rich in uranium: 1034.

Monazite Occurrences

General: monazite in granite and gneisses: 104; allanite, columbite, gummite, monazite, thorite, torbernite, uraconite, uraninite, and xenotime: 1098.

Southeast Part: pegmatites contain, among others, the following minerals: autunite, beryl, columbite, cyrtolite, monazite, uraconite, uraninite, uranotile, xenotime, zircon; pegmatites range in thickness from less than 1 in. to over 200 ft. as in the Bedford quarries: 749.

Prospectors' Guides

Exploration methods: 1101, 1107.

Mining laws: 1101, 1107.

Mining methods: 1107.

Regulations regarding prospecting for uranium on state-owned lands: 1107.

Uranium: 1101, 1107.

Radioactive Rocks

General: reconnaissance surveys have been made by U.S.G.S. of the Hudson and Housatonic Highlands, the Adirondack Mountains, the Hudson Valley, and the Clinton formation in the central part of the state and gave largely negative results; the most promising of these areas seem to be the Hudson and Housatonic Highlands where a range in radioactivity from 0.001 to 0.240% eU_3O_8 was indicated with 0.002% eU_3O_8 in most of the rocks and high radioactivity found in less than 1% of the rock: 1107;

NEW YORK (contd.)

General (contd.)
Radioactive Rocks
General:
radioactivity studies made in 1951 on sedimentary rocks in central New York by R. C. Vickers, with the financial support of the New York State Geological Survey, revealed no economically significant uranium mineralization in any of the many formations tested; the Union Springs shale had the highest radioactivity, 0.004% eU_3O_8, and except for the phosphatic nodules of the basal Onondaga limestone, the only formations sampled which contained more than 0.001% eU_3O_8 were the dark shales of Devonian age: 1107; pegmatites and gneisses injected by pegmatites often contain radioactive minerals, including enough uranium minerals to indicate local radioactive "highs" when checked with a counter; such occurrences have not yet proved to be of economic value but recent work on low cost milling procedures may develop an economic method for producing merchantable uranium concentrates from low grade (possibly less than 0.10% U_3O_8) pegmatite deposits of sufficient size: 1107; the Clinton formation of Silurian age was examined radiometrically by U.S.G.S. geologists at 31 localities in Maryland, New Jersey, New York, and Pennsylvania, with particular attention to the phosphatic and hematitic parts of the formation; none of the places tested showed abnormal radioactivity or suggested a concentration of radioactive elements in excess of 0.004% eU, which was also the maximum radioactivity of samples tested; no sample contained more than 0.001% U; no further work planned by U.S.G.S.: 935; the Clinton formation was examined at six localities but, because of a fall out of radioactive snow and

NEW YORK (contd.)

General (contd.)
Radioactive Rocks
General:
dust, which gave readings of 0.5 - 1.5 mr/hr, radiometric examination in the field was possible only at Niagara gorge, Sterling Station, and the Clinton Metallic Paint Company mine; at other localities, uncontaminated samples were collected for radiometric analysis in the laboratory: 935.

Adirondack Mountains: radioactivity of Precambrian rocks studied with car-mounted Geiger-Mueller equipment; supplementary studies were made on foot of areas showing abnormally high (more than 0.003% eU) radioactivity; at contact of igneous and metamorphic rocks, average radioactivity was estimated as 0.003-0.004% eU, while pegmatites contained as much as 0.043% U and 0.63% Th; iron slag containing 0.030% eU, 0.007% U, and 0.11% ThO_2 was found at Moriah Center and radioactivity of several other abnormally radioactive areas was due, in part, to the U and Th content of iron minerals: 875; order of magnitude of uranium content of syenites is approximately equivalent to that of the granitic units (0.00X% U) according to results of analytical methods used: 1103.

Hudson Valley: radioactivity of Paleozoic shale-slate belt studied with car-mounted Geiger-Mueller equipment; average radioactivity of the most strongly radioactive rocks found to be 0.003% eU; samples taken were analyzed chemically: 875.

NEW YORK (contd.)

General (contd.)
Radioactive Waters
Rivers
Mississippi, Hudson, and St. Lawrence Rivers: waters contained 0.048-0.44 x 10^{-8}% U, all much less than in British rivers: 722.
Thorite Occurrences
General: allanite, columbite, gummite, monazite, thorite, torbernite, uraconite, uraninite, and xenotime: 1098.
Thorium Occurrences
General: monazite in granite and gneisses: 104; allanite, columbite, gummite, monazite, thorite, torbernite, uraconite, uraninite, and xenotime: 1098; allanite deposits are known in Colorado, New Jersey, New York, North Carolina, Pennsylvania, Texas, Virginia, and Wyoming; while most of the deposits are of mineralogical interest only, commercial shipments have been made from Wyoming, Virginia, and possibly North Carolina: 1105; several interesting occurrences in Precambrian granitic gneiss of New Jersey and New York are associated with magnetite-rich rocks; two of particular interest were: uraninite along contact of a footwall gneiss and magnetite ore, but uranium is known only in pockets one to two ft. in diameter scattered at random along zones parallel to gneissic foliation and its distribution is unrelated to folds, faults, and shears in the gneiss indicating that the association with magnetite and ferromagnesian gneiss is a better ore guide in this occurrence than the structure: 1005; several interesting occurrences in Precambrian granitic gneiss of New Jersey and New York are associated with magnetite-rich rocks; two of particular interest were: uranothorite in an extensive footwall zone of a magnetite orebody, the

NEW YORK (contd.)

General (contd.)
Thorium Occurrences
General:
uraniferous zone being stained red by hematite as were the borders of associated radioactive fractures; such hematite staining is a prominent feature of many large uranium vein deposits, especially in the Precambrian shield area of western Canada: 1005.
Adirondack Mountains: allanite in magnetite deposits: 1098; magnetite deposits here and in the crystalline belt in New York contain small concentrations of uraninite: 1103; radioactivity of Precambrian rocks studied with car-mounted Geiger-Mueller equipment; supplementary studies were made on foot of areas showing abnormally high (more than 0.003% eU) radioactivity; at contact of igneous and metamorphic rocks, average radioactivity was estimated as 0.003 - 0.004% eU, while pegmatites contained as much as 0.043% U and 0.63% Th; iron slag containing 0.030% eU, 0.007% U, and 0.11% ThO_2 was found at Moriah Center and radioactivity of several other abnormally radioactive areas was due, in part, to the U and Th content of iron minerals: 875.
Champlain iron region: mineral resembling thorite and orangite found at an unnamed locality; chemical analysis showed 0.40 ThO and 9.96 U_2O_3; given new name, uranothorite, because of higher uranium content: 705; uranothorite; chemical analysis showed: 52.07 ThO_2, 9.96 UO_2, and no UO_3: 882.
Lake Champlain Iron District: uranothorite, a thorite rich in uranium: 1034.

NEW YORK (contd.)

General (contd.)
Thorium Occurrences
Southeast Part: pegmatites contain, among others, the following minerals: autunite, beryl, columbite, cyrtolite, monazite, uraconite, uraninite, uranotile, xenotime, zircon; pegmatites range in thickness from less than 1 in. to over 200 ft. as in the Bedford quarries: 749.
Iron Deposits, Thorium-bearing
General: several interesting occurrences in Precambrian granitic gneiss of New Jersey and New York are associated with magnetite-rich rocks; two of particular interest were: uraninite along contact of a footwall gneiss and magnetite ore, but uranium is known only in pockets one to two ft. in diameter scattered at random along zones parallel to gneissic foliation and its distribution is unrelated to folds, faults, and shears in the gneiss indicating that the association with magnetite and ferromagnesian gneiss is a better ore guide in this occurrence than the structure: 1005; uranothorite in an extensive footwall zone of a magnetite orebody the uraniferous [illegible] zone being stained red by hematite as were the borders of associated radioactive fractures; such hematite staining is a prominent feature of many large uranium vein deposits, especially in the Precambrian shield area of western Canada: 1005.
Adirondack Mountains: magnetite deposits here and in the crystalline belt in New York contain small concentrations of uraninite: 1103; radioactivity of Precambrian rocks

NEW YORK (contd.)

General (contd.)
Thorium Occurrences
Iron Deposits, Thorium-bearing
Adirondack Mountains: studied with car-mounted Geiger-Mueller equipment; supplementary studies were made on foot of areas showing abnormally high (more than 0.003% eU) radioactivity; at contact of igneous and metamorphic rocks, average radioactivity was estimated as 0.003 - 0.004% eU, while pegmatites contained as much as 0.043% U and 0.63%Th; iron slag containing 0.030% eU, 0.007% U, and 0.11% ThO_2 was found at Moriah Center and radioactivity of several other abnormally radioactive areas was due, in part, to the U and Th content of iron minerals: 875.
Torbernite Occurrences
General: allanite, columbite, gummite, monazite, thorite, torbernite, uraconite, uraninite, and xenotime: 1098.
Uraconite Occurrences
General: allanite, columbite, gummite, monazite, thorite, torbernite, uraconite, uraninite, and xenotime: 1098.
Southeast Part: pegmatites contain, among others, the following minerals: autunite, beryl, columbite, cyrtolite, monazite, uraconite, uraninite, uranotile, xenotime, zircon; pegmatites range in thickness from less than 1 in. to over 200 ft. as in the Bedford quarries: 749.
Uraninite Occurrences
General: allanite, columbite, gummite, monazite, thorite, torbernite, uraconite, uraninite, and xenotime: 1098; several interesting uranium occurrences in Precambrian granitic gneiss of New Jersey and New York are associated with magnetite-rich rocks;

NEW YORK (contd.)

General (contd.)
Uraninite Occurrences
General:
one of particular interest was: uraninite along contact of a footwall gneiss and magnetite ore, but uranium is known only in pockets one to two ft. in diameter scattered at random along zones parallel to gneissic foliation and its distribution is unrelated to folds, faults, and shears in the gneiss indicating that the association with magnetite and ferromagnesian gneiss is a better ore guide in this occurrence than the structure: 1005.
Adirondack Mountains: magnetite deposits here and in the crystalline belt in New York contain small concentrations of uraninite: 1103.
Southeast Part: pegmatites contain, among others, the following minerals: autunite, beryl, columbite, cyrtolite, monazite, uraconite, uraninite, uranotile, xenotime, zircon; pegmatites range in thickness from less than 1 in. to over 200 ft. as in the Bedford quarries: 749.
Uranium Exploration
General: airborne radiometric survey for uranium ore in northern New Jersey and adjacent southeastern New York area by Safair Flying Service of Teterboro, New Jersey; ground reconnaissance combined with air operations: 1086.
Adirondack Mountains: radioactivity of Precambrian rocks studied with car-mounted Geiger-Mueller equipment; supplementary studies were made on foot of areas showing abnormally high (more than 0.003% eU) radioactivity; at contact of igneous and metamorphic rocks, average radioactivity was estimated as 0.003-0.004% eU, while pegmatites

NEW YORK (contd.)

General (contd.)
Uranium Exploration
Adirondack Mountains:
contained as much as 0.043% U and 0.63% Th; iron slag containing 0.030% eU, 0.007% U and 0.11% ThO_2 was found at Moriah Center and radioactivity of several other abnormally radioactive areas was due, in part, to the U and Th content of iron minerals: 875.
Hudson Valley: radioactivity of Paleozoic shale-slate belt studied with car-mounted Geiger-Mueller equipment; average radioactivity of the most strongly radioactive rocks found to be 0.003% eU; samples taken were analyzed chemically: 875.
Methods: 1101, 1107.
Mining laws: 1101, 1107.
Mining methods: 1107.
Prospectors' guide: 1101, 1107.
Regulations regarding prospecting for uranium on state-owned lands: 1107.
Geophysical Exploration(Airborne)
General: airborne radiometric survey for uranium ore in northern New Jersey and adjacent southeastern New York area by Safair Flying Service of Teterboro, New Jersey; ground reconnaissance combined with air operations: 1086.
Geophysical Exploration (Ground)
Adirondack Mountains: radioactivity of Precambrian rocks studied with car-mounted Geiger-Mueller equipment; supplementary studies were made on foot of areas showing abnormally high (more than 0.003% eU) radioactivity; at contact of igneous and metamorphic rocks, average radioactivity was estimated as 0.003-0.004 % eU, while pegmatites contained as much as 0.043% U and 0.63% Th; iron slag containing 0.030%

NEW YORK (contd.)

General (contd.)
Uranium Exploration
Geophysical Exploration (Ground)
Adirondack Mountains:
eU, 0.007% U, and 0.11% ThO_2 was found at Moriah Center and radioactivity of several other abnormally radioactive areas was due, in part, to the U and Th content of iron minerals: 875.
Hudson Valley: radioactivity of Paleozoic shale-slate belt studied with car-mounted Geiger-Mueller equipment; average radioactivity of the most strongly radioactive rocks found to be 0.003% eU; samples taken were analyzed chemically: 875.
Uranium Occurrences
General: allanite, columbite, gummite, monazite, thorite, torbernite, uraconite, uraninite, and xenotime: 1098; uranium: 13; uranium in black shales: 426; the discovery of uranium with magnetite at Camp Smith led to examination of the many old magnetite mines and prospects in the Hudson Highlands and the Adirondack Mountains and, although the results were largely negative, the scientific aspects of the problem may warrant further study: 1107; several interesting uranium occurrences in Precambrian granitic gneiss of New Jersey and New York are associated with magnetite-rich rocks; three of particular interest were: uraninite along contact of a footwall gneiss and magnetite ore, but uranium is known only in pockets one to two ft. in diameter scattered at random along zones parallel to gneissic foliation and its distribution is unrelated to folds, faults, and shears in the gneiss indicating that the association with magnetite and ferromagnesian gneiss is a better ore guide in this occurrence than the structure: 1005;

NEW YORK (contd.)

General (contd.)
Uranium Occurrences
General:
uranium confined to chlorite-hornblende-magnetite rich layers in tightly folded and dragfolded schistose gneiss bordering the magnetite ore; uranium concentrations are localized along the axial parts of these folds forming pencil-like shoots several feet across, of good grade, and parallel to the regional plunge: 1005; uranothorite in an extensive footwall zone of a magnetite orebody, the uraniferous zone being stained red by hematite as were the borders of associated radioactive fractures; such hematite staining is a prominent feature of many large uranium vein deposits, especially in the Precambrian shield area of western Canada: 1005; commercial deposits of uraninite or other primary minerals may be found in the crystalline rocks of eastern New York or in or near iron and other mineral deposits in New Jersey and New York: 883; not a single economic body of uranium ore has been proved in the state and only a few occurrences have appeared to merit exploratory drilling and modest development work: 1107; potential sources of uranium which should be investigated further include Adirondack Mountains, Hudson Highlands, Housatonic Highlands, and Catskill red beds, although exploration in these area to date has revealed no possible commercial orebodies; geologic sketch map gives locations of these areas: 1107; pegmatites and gneisses injected by pegmatites often contain radioactive minerals, including enough uranium minerals to indicate

NEW YORK (contd.)

General (contd.)
Uranium Occurrences
General:
local radioactive "highs" when checked with a counter; such occurrences have not yet proved to be of economic value but recent work on low cost milling procedures may develop an economic method for producing merchantable uranium concentrates from low grade (possibly less than 0.10% U_3O_8) pegmatite deposits of sufficient size: 1107; the red bed formations of the Catskill region are similar in physical characteristics and mode of deposition to uranium-bearing red beds on the Colorado Plateau, suggesting it might be worth examining them for secondary uranium minerals like carnotite; occurrences of carnotite have been reported recently but few reports have been verified and no economic orebodies have been proved: 1107; reconnaissance surveys have been made by U.S.G.S. of the Hudson and Housatonic Highlands, the Adirondack Mountains, the Hudson Valley, and the Clinton formation in the central part of the state and gave largely negative results; the most promising of these areas seem to be the Hudson and Housatonic Highlands where a range in radioactivity from 0.001 to 0.240% eU_3O_8 was indicated with 0.002% eU_3O_8 in most of the rocks and high radioactivity found in less than 1% of the rock: 1107; radioactivity studies made in 1951 on sedimentary rocks in central New York by R. C. Vickers, with the financial support of the New York State Geological Survey, revealed no economically significant uranium mineralization in any of the many formations tested; the Union Springs

NEW YORK (contd.)

General (contd.)
Uranium Occurrences
General:
shale had the highest radioactivity, 0.004% eU_3O_8, and, except for the phosphatic nodules of the basal Onondaga limestone, the only formations sampled which contained more than 0.001% eU_3O_8 were the dark shales of Devonian age: 1107.

Abandoned copper mine: unnamed mine being explored for uranium; if results are favorable, probably exploration work will be carried out at other abandoned copper and iron mines: 1102.

Adirondack Mountains: magnetite deposits here and in the crystalline belt in New York contain small concentrations of uraninite: 1103; order of magnitude of uranium content of syenites is approximately equivalent to that of the granitic units (0.00X% U) according to results of analytical methods used: 1103; radioactivity of Precambrian rocks studied with car-mounted Geiger-Mueller equipment; supplementary studies were made on foot of areas showing abnormally high (more than 0.003% eU) radioactivity; at contact of igneous and metamorphic rocks, average radioactivity was estimated as 0.003-0.004% eU, while pegmatites contained as much as 0.043% U and 0.63% Th; iron slag containing 0.030% eU 0.007% U and 0.11% ThO_2 was found at Moriah Center and radioactivity of several other abnormally radioactive areas was due, in part, to the U and Th content of iron minerals: 875.

Appalachian region: one of the most promising and least prospected areas in the United States since the Appalachians extend from Alabama and Georgia to Quebec and

NEW YORK (contd.)

General (contd.)
Uranium Occurrences
Appalachian region:
uranium minerals have been found in Alabama, Kentucky, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Tennessee, and Vermont: 1093; uranium present in pegmatites and disseminated deposits in granite in the pegmatite belt that follows the trend of the Appalachian Mountains with uranium occurrences reported from New York and Vermont on the north to Georgia on the south: 1106.
Bibliography of U.S.G.S. Reports: 572, 1004.
Champlain iron region: mineral resembling thorite and orangite found at an unnamed locality; chemical analysis showed 0.40 ThO and 9.96 U_2O_3; given new name, uranothorite, because of higher uranium content: 705; uranothorite; chemical analysis showed: 52.07 ThO_2, 9.96 UO_2, and no UO_3: 882.
Iron mines: primary uranium minerals present: 883.
Lake Champlain Iron District: uranothorite, a thorite rich in uranium: 1034.
Mississippi, Hudson, and St. Lawrence Rivers: waters contained 0.048-0.44 x 10^{-8}% U, all much less than in British rivers: 722.
Southeast Part: pegmatites contain, among others, the following minerals: autunite, beryl, columbite, cyrtolite, monazite uraconite, uraninite, uranotile, xenotime, zircon; the pegmatites range in thickness from less than 1 in. to over 200 ft. as in the Bedford quarries: 749.
Iron Deposits, Uranium-bearing
General: several interesting uranium occurrences in Precambrian granitic gneiss of New Jersey and New York are associated with magnetite-rich rocks; three of particular interest were: uraninite along contact of a

NEW YORK (contd.)

General (contd.)
Uranium Occurrences
Iron Deposits, Uranium-bearing
General:
footwall gneiss and magnetite ore, but uranium is known only in pockets one to two ft. in diameter scattered at random along zones parallel to gneissic foliation and its distribution is unrelated to folds, faults, and shears in the gneiss indicating that the association with magnetite and ferromagnesian gneiss is a better ore guide in this occurrence than the structure: 1005; uranothorite in an extensive footwall zone of a magnetite orebody, the uraniferous zone being stained red by hematite as were the borders of associated radioactive fractures; such hematite staining is a prominent feature of many large uranium vein deposits, especially in the Precambrian shield area of western Canada: 1005; uranium confined to chlorite-hornblende-magnetite rich layers in tightly folded and drag-folded schistose gneiss bordering the magnetite ore; uranium concentrations are localized along the axial parts of these folds forming pencil-like shoots several feet across, of good grade, and parallel to the regional plunge: 1005.
Adirondack Mountains: magnetite deposits here and in the crystalline belt in New York contain small concentrations of uraninite: 1103; radioactivity of Precambrian rocks studied with car-mounted Geiger-Mueller equipment; supplementary studies were made on foot of areas showing abnormally high (more than 0.003% eU) radioactivity; at contact of igneous and metamorphic rocks, average radioactivity was estimated as

NEW YORK (contd.)

General (contd.)
Uranium Occurrences
Iron Deposits, Uranium-bearing
Adirondack Mountains:
0.003-0.004% eU, while pegmatites contained as much as 0.043% U and 0.63% Th; iron slag containing 0.030% eU, 0.007% U, and 0.11% ThO_2 was found at Moriah Center and radioactivity of several other abnormally radioactive areas was due, in part, to the U and Th content of iron minerals: 875.
Iron mines: primary uranium minerials: 883.
Waters, Uranium-bearing
Rivers
Mississippi, Hudson, and St. Lawrence Rivers: waters contained 0.048-0.44 x 10^{-8}% U, all much less than in British rivers: 722.
Uranothorite Occurrences
General: several interesting occurrences in Precambrian granitic gneiss of New Jersey and New York are associated with magnetite-rich rocks; one of particular interest was: uranothorite in an extensive footwall zone of a magnetite orebody, the uraniferous zone being stained red by hematite as were the borders of associated radioactive fractures; such hematite staining is a prominent feature of many large uranium vein deposits, especially in the Precambrian shield area of western Canada: 1005.
Champlain iron region: mineral resembling thorite and orangite found at an unnamed locality; chemical analysis showed 0.40 ThO and 9.96 U_2O_3; given new name, uranothorite, because of higher uranium content: 705; uranothorite; chemical analysis showed: 52.07 ThO_2, 9.96 UO_2, and no UO_3: 882.

NEW YORK (contd.)

General (contd.)
Uranothorite Occurrences
Lake Champlain Iron District: uranothorite, a thorite rich in uranium: 1034.
Uranotile Occurrences
Southeast Part: pegmatites contain, among others, the following minerals: autunite, beryl, columbite, cyrtolite, monazite, uraconite, uraninite, uranotile, xenotime, zircon; pegmatites range in thickness from less than 1 in. to over 200 ft. as in the Bedford quarries: 749.
Waters, Uranium-bearing
Rivers
Mississippi, Hudson, and St. Lawrence Rivers: waters contained 0.048-0.44 x 10^{-8}% U, all much less than in British rivers: 722.
Xenotime Occurrences
General: allanite, columbite, gummite, monazite, thorite, torbernite, uraconite, uraninite, and xenotime: 1098.
Southeast Part: pegmatites contain, among others, the following minerals: autunite, beryl, columbite, cyrtolite, monazite, uraconite, uraninite, uranotile, xenotime, zircon; pegmatites range in thickness from less than 1 in. to over 200 ft. as in the Bedford quarries: 749.

Age Determinations
See under individual county names and under Index III, Age Determinations-New York: 821.

Albany County
Black Shale, Uranium-bearing
Ravena, 1 3/4 mi. NW of: radioactivity determinations on Esopus black and gray shale of Middle Devonian age, estimated average radioactivity 0.002% eU; grab sample contained 0.002% eU and 0.001% U by chemical analysis: 875.

NEW YORK (contd.)

Albany County (contd.)
Radioactive Rocks
Ravena, 1 3/4 mi. NW of: radioactivity determinations on Esopus black and gray shale of Middle Devonian age, estimated average radioactivity 0.002% eU; grab sample contained 0.002% eU and 0.001% U by chemical analysis: 875.
Uranium Occurrences
Ravena, 1 3/4 mi. NW of: radioactivity determinations on Esopus black and gray shale of Middle Devonian age, estimated average radioactivity 0.002% eU; grab sample contained 0.002% eU and 0.001% U by chemical analysis: 875.

Allanite Occurrences
See under individual county names and under Index III, Thorium Occurrences-New York: 78, 82, 249, 633, 637, 644, 662, 666, 667, 683, 710, 711, 712, 713, 734, 760, 779, 807, 809, 810, 811, 843, 846, 850, 851, 875, 878, 879, 880, 920, 921, 947, 950, 1021, 1025, 1027, 1030, 1033, 1043, 1046, 1056, 1094, 1098, 1105.

Apatite, Rare Earths in
See under individual county names and under Index III, Apatite, Rare Earths in-New York: 995.

Apatite, Thorium-bearing
See under individual county names and under Index III, Apatite, Thorium-bearing-New York: 843, 995.

Apatite, Uranium-bearing
See under individual county names and under Index III, Apatite, Uranium-bearing-New York: 843, 995.

NEW YORK (contd.)

Autunite Occurrences
See under individual county names and under Index III, Autunite Occurrences-New York: 675, 681, 693, 749, 763, 784, 813, 839, 846, 847, 986, 987, 1021, 1032, 1094.

Beta-Uranotile Occurrences
See under individual county names and under Index III, Beta-Uranotile Occurrences-New York: 972.

Bibliographies
Uranium Occurrences
Bibliography of U.S.G.S. Reports: 572, 1004.

Black Shales, Uranium-bearing
See under individual county names and under Index III, Black Shales, Uranium-bearing-New York: 426, 875, 995.

Bronx County
See Bronx-Kings-New York-Queens-Richmond Counties: 846.

Bronx-Kings-New York-Queens-Richmond Counties
Allanite Occurrences
New York City
General (all five boroughs): allanite, autunite, gummite, microlite, monazite, orthite (allanite), torbernite, uraninite, xenotime: 846.
Autunite Occurrences
New York City
General (all five boroughs): allanite, autunite, gummite, microlite, monazite, orthite (allanite), torbernite, uraninite, xenotime: 846.

Gummite Occurrences
New York City
General (all five boroughs): allanite, autunite, gummite, microlite, monazite, orthite (allanite), torbernite, uraninite, xenotime: 846.

NEW YORK (contd.)

Bronx-Kings-New York-Queens-Richmond Counties (contd.)

Microlite Occurrences
New York City
General (all five boroughs): allanite, autunite, gummite, microlite, monazite, orthite (allanite), torbernite, uraninite, xenotime: 846.

Monazite Occurrences
New York City
General (all five boroughs): allanite, autunite, gummite, microlite, monazite, orthite (allanite), torbernite, uraninite, xenotime: 846.

Orthite Occurrences
New York City
General (all five boroughs): allanite, autunite, gummite, microlite, monazite, orthite (allanite), torbernite, uraninite, xenotime: 846.

Thorium Occurrences
New York City
General (all five boroughs): allanite, autunite, gummite, microlite, monazite, orthite (allanite), torbernite, uraninite, xenotime: 846; uraninite reported but location was not given: 768.

Torbernite Occurrences
New York City
General (all five boroughs): allanite, autunite, gummite, microlite, monazite, orthite (allanite), torbernite, uraninite, xenotime: 846.

Uraninite Occurrences
New York City
General (all five boroughs): allanite , autunite, gummite, microlite, monazite, orthite (allanite), torbernite, uraninite, xenotime: 846; uraninite reported but location was not given: 768.

NEW YORK (contd.)

Bronx-Kings-New York-Queens-Richmond Counties (contd.)

Uranium Occurrences
New York City
General (all five boroughs): allanite, autunite, gummite, microlite, monazite, orthite (allanite), torbernite, uraninite, xenotime: 846; uraninite reported but location was not given: 768.

Xenotime Occurrences
New York City
General (all five boroughs): allanite, autunite, gummite, microlite, monazite, orthite (allanite), torbernite, uraninite, xenotime: 846.

(See also New York County for information on Manhattan Island and Richmond County for information on Staten Island).

Carnotite Occurrences
See under individual county names and under Index III, Carnotite Occurrences-New York: 1107.

Cayuga County

Radioactive Rocks
Sterling, 1 mi. NE of: radiometric examination in the field of Furnaceville iron ore member (?) of Clinton formation, a hematitic iron ore, no radioactivity found; no samples analyzed: 935.

Central Part

Monazite Occurrences
Tully limestone: monazite as a detrital mineral; probably came from an acid igneous rock: 985.

Thorium Occurrences
Tully limestone: monazite as a detrital mineral; probably came from an acid igneous rock: 985.

NEW YORK (contd.)

Clinton County

Allanite Occurrences

Adirondack magnetite deposits: allanite in pegmatites which seam the iron deposits: 633.

Arnold Hill: magnetic iron ore deposit here persistently associated with pegmatite stringers, which commonly contain allanite, fluorite, tourmaline, and zircon: 809.

Lyon Mountain: magnetic iron ore deposit here persistently associated with pegmatite stringers, which commonly contain allanite, fluorite, tourmaline, and zircon: 809.

Palmer Hill: allanite as brown poorly crystallized masses in pegmatites which seam the magnetite deposits: 633; magnetic iron ore deposit here persistently associated with pegmatite stringers, which commonly contain allanite, fluorite, tourmaline, and zircon: 809.

Radioactive Magnetite

Arnold Hill mines 3 mi. NE of Ausable Forks: radioactivity of three ore bodies of gray vein magnetite, black vein magnetite, and blue vein martite, and Lyon Mountain granite gneiss, 0.03 mr/hr.: 843.

Averill mine NW side of Dannemora village: magnetite ore in pyroxene granite gneiss and Lyon Mountain granite gneiss, with thorite(?) in amphibolite of hanging wall, less than 0.03 mr/hr.: 843.

Battie mine 8 mi. NE of Ausable Forks: radioactivity determinations on three ore zones gave values of 0.07 max. and 0.03 mr/hr; lower one containing active mineral lessigite, is magnetite that has replaced microantiperthite gneiss, and hanging wall is pink pyroxene granite gneiss, of which, in lower zone, skarn has slight radioactivity of 0.05 - 0.07 mr/hr: 843.

NEW YORK (contd.)

Clinton County

Radioactive Magnetite

Black Brook mines in village of Black Brook: radioactivity of magnetite-bearing quartz-feldspar pegmatite in Lyon Mountain granite gneiss, less than 0.03 mr/hr: 843.

Chateaugay mine operated by Republic Steel Corp. at Lyon Mountain: radioactivity determinations on magnetite replacement of pyroxene-contaminated microcline-microperthite granite gneiss and the Lyon Mountain granite gneiss, gave negative results; assays also were run on two samples: 843.

Ellis Ore pits 1 mi. NE of Dannemora: radioactivity of magnetite ore in feldspar-pyroxene rock and Lyon Mountain granite gneiss containing thorite and zircon, 1.0 max. mr/hr: 843.

LeMar pit 1 mi. NE of Dannemora: radioactivity of magnetite ore in granitized pyroxene amphibolite and Lyon Mountain granite gneiss, less than 0.03 mr/hr: 843.

Lyon Mountain: age determination tests were made on one specimen of magnetite and gave the following results: No. 364, gave 0.08 activity by direct alpha count, 1.59 He, and age 580 m.y.: 785.

Mitchell prospect near E bank of Little Ausable River, N of Ausable Forks: radioactivity of magnetite in granitized skarn and Lyon Mountain granite gneiss, less than 0.03 mr/hr: 843.

Palmer Hill group of mines 2 mi. N of Ausable Forks: radioactivity of magnetite disseminated in medium-grained Lyon Mountain granite gneiss with large fluorite masses, radioactive spots in pegmatite phases, and allanite, sphene, and zircon as radioactive minerals, less than 0.03 mr/hr.: 843.

NEW YORK (contd.)

Clinton County (contd.)

Radioactive Magnetite

Russia Station mine at S end of Johnson Mountain 4 mi. N of Bedford: radioactivity of magnetite in pyroxene-hornblende plagioclase gneiss and Lyon Mountain granite gneiss, less than 0.03 mr/hr.: 843.

Rutgers mine 5 mi. N of Ausable Forks: mine workings flooded and past production unknown; radioactivity measurements of outcrops and dump material show magnetite ore contains 0.005-0.010% eU, the syenite gneiss and pods and schlieren of skarn in gneiss contain less than 0.002% eU, and a sample, FR-51, of lean magnetite ore contains 0.006% eU; mineralogic study shows zircon and apatite are the radioactive minerals, the ore and sub-ore on dump are slightly radioactive, and radioactive elements probably are disseminated throughout magnetite orebody and not concentrated locally; geology, mineralogy, and eU content are similar to the Old Bed at Mineville: 843.

Radioactive Rocks

Adirondack Mountains

Clayburg, Unnumbered highway 4.8 mi. S of: radioactivity of glacial cover on hornblende granite area, average estimated as 0.003% eU: 875.

Dannemora, New York Highway 374, 0.7 and 1.6 mi. W of: radioactivity of long outcrop of gneiss in area inferred as Lyon Mountain granite, estimated as 0.004-0.005% eU with average estimated as 0.002% eU; 875.

Thorite Occurrences

Averill mine NW side of Dannemora village: magnetite ore in pyroxene granite gneiss and Lyon Mountain granite gneiss, with thorite(?) in amphibolite of hanging wall, less than 0.03 mr/hr.: 843.

NEW YORK (contd.)

Clinton County (contd.)

Thorium Occurrences

Adirondack magnetite deposits: allanite in pegmatites which seam the iron deposits: 633.

Arnold Hill: magnetic iron ore deposit here persistently associated with pegmatite stringers, which commonly contain allanite, fluorite, tourmaline, and zircon: 809.

Averill mine NW side of Dannemora village: magnetite ore in pyroxene granite gneiss and Lyon Mountain granite gneiss, with thorite(?) in amphibolite of hanging wall, less than 0.03 mr/hr.: 843.

Lyon Mountain: magnetic iron ore deposit here persistently associated with pegmatite stringers, which commonly contain allanite, fluorite, tourmaline, and zircon: 809.

Palmer Hill: allanite as brown poorly crystallized masses in pegmatites which seam the magnetite deposits: 633; magnetic iron ore deposit here persistently associated with pegmatite stringers, which commonly contain allanite, fluorite, tourmaline, and zircon: 809.

Columbia County

Black Shale, Uranium-bearing

Stuyvesant, in railroad cut S of station: radioactivity determinations on Deepkill black shale of Lower Ordovician age, estimated radioactivity never exceeded 0.002 % eU in the 200 ft. of stratigraphic outcrop scanned in traverse on foot; sample contained 0.002% eU and 0.001% U by chemical analysis: 875.

Radioactive Rocks

Hudson Valley

North Hillsdale, New York Highway 217, 3 mi. W of: radioactivity of slate in metamorphosed Hudson

NEW YORK (contd.)

Columbia County (contd.)
Radioactive Rocks
Hudson Valley
North Hillsdale, New York Highway 217, 3 mi. W of: River formation, estimated as 0.000-0.003% eU; many outcrops of which most are negligibly radioactive: 875.
Slate, Uranium-bearing
Chatham, New York Highway 203, 0.9 mi. E of railroad crossing in: radioactivity determinations on a slate in Hudson River schist of Ordovician age, average estimated radioactivity, 0.002% eU; grab sample of slate contained 0.002% eU and 0.001% U: 875.
Uranium Occurrences
Chatham, New York Highway 203, 0.9 mi. E of railroad crossing in: radioactivity determinations on a slate in Hudson River schist of Ordovician age, average estimated radioactivity, 0.002% eU; grab sample of slate contained 0.002% eU and 0.001% U: 875.
Stuyvesant, in railroad cut S of station: radioactivity determinations on Deepkill black shale of Lower Ordovician age, estimated radioactivity never exceeded 0.002% eU in the 200 ft. of stratigraphic outcrop scanned in traverse on foot; sample contained 0.002% eU and 0.001% U by chemical analysis: 875.
Black Shale, Uranium-bearing
Stuyvesant, in railroad cut S of station: radioactivity determinations on Deepkill black shale of Lower Ordovician age, estimated radioactivity never exceeded 0.002% eU in the 200 ft. of stratigraphic outcrop scanned in traverse on foot; sample contained 0.002% eU and 0.001% U by chemical analysis: 875.

NEW YORK (contd.)

Columbia County (contd.)
Uranium Occurrences
Slate, Uranium-bearing
Chatham, New York Highway 203, 0.9 mi. E of railroad crossing in: radioactivity determinations on slate in Hudson River schist of Ordovician age, average estimated radioactivity, 0.002% eU; grab sample of slate contained 0.002% eU and 0.001% U: 875.

Cyrtolite Occurrences
See under individual county names and under Index III, Cyrtolite Occurrences-New York: 78, 82, 659, 675, 749, 813, 827, 834, 838, 846, 870, 871, 872, 925, 948, 1094, 1098.

Dutchess County
Allanite Occurrences
Ballard Lake, north shore: allanite and zircon in a granite dike: 1046.
Shaft No. 7 of Delaware aqueduct near Fishkill: lustrous black allanite crystals in quartzite: 1030.
West Point quadrangle, areas shown on: allanite as a rare accessory mineral in Storm King granite: 667.
Radioactive Rocks
Hudson Valley
Billings, New York Highway 82, at 3.0, 3.6, 5.2, 7.6, and 7.7 mi. N of: radioactivity of slate in Ordovician-Cambrian Hudson River pelite, estimated as 0.002-0.004% eU: 875.
Dover Plains, New York Highway 22, in 50-ft. road cut 1.5 mi. S of: radioactivity of dolomitic part of Stockbridge limestone, Wappinger crystalline marble, estimated as 0.003-0.004% eU with average estimated radioactivity, 0.001-0.002% eU: 875.
Dover Plains, New York Highway 343, 2.9 and 5.5 mi. W of: radioactivity of slate in Ordovician-Cambrian Hudson River

NEW YORK (contd.)

Dutchess County (contd.)
Radioactive Rocks
Hudson Valley
Dover Plains, New York Highway 343, 2.9 and 5.5 mi. W of: pelite, estimated as 0.002-0.003% eU: 875.
Pine Plains, New York Highway 199, 1.1 mi. W of: radioactivity of gray fissile slatey shale, estimated as 0.002-0.003% eU: 875.
Poughkeepsie, New York Highway 55, at 2.8, 4.6, and 8.2 mi. E of junction with New York Highway 44 in: radioactivity of slate in Hudson River group of Ordovician age, estimated as 0.002-0.004% eU: 875.
Wingdale, unnumbered road 3 mi. W of: radioactivity of gneiss and schist in Berkshire schist, estimated as 0.002-0.004% eU; 875.
Wingdale, unnumbered road 3.9 to 4.1, 5.4, and 6.1 to 6.5 mi. W of: radioactivity of phyllitic slates in Hudson River pelite, estimated as 0.002-0.004% eU: 875.
Thorium Occurrences
Ballard Lake, north shore: allanite and zircon in a granite dike: 1046.
Shaft No. 7 of Delaware aqueduct near Fishkill: lustrous black allanite crystals in quartzite: 1030.
West Point quadrangle, areas shown on: allanite as a rare accessory mineral in Storm King granite: 667.

Essex County
Allanite Occurrences
General: allanite: 249.
Adirondack magnetite deposits: allanite in pegmatites which seam the iron deposits: 633.

NEW YORK (contd.)

Essex County (contd.)
Allanite Occurrences
Breeds Hill S of Crown Point village about 1 mi. from Lake Champlain: allanite in pegmatite body opened by Crown Point Spar Co. for feldspar mining: 880.
Crown Point: allanite abundant in biotite gneiss: 807.
Crown Point Spar Co. quarry on Breeds Hill S of Crown Point and 1 mi. from and 500 ft. above shore of Lake Champlain: pegmatite boss quarried for feldspar but also contains small amounts of biotite and occasional crystals of titanite, magnetite, zircon, tourmaline, pyrite, chalcopyrite, and allanite: 879.
Delano: large pegmatite vein in rocky cliff NW of steamboat landing, contains abundant allanite in certain portions: 807.
Delano on N side of Mount Defiance: allanite crystals in pegmatite: 880.
Hammond Iron Mine, Hammondville: allanite associated with magnetite in quartz showing radial fracturing: 947.
Mineville: allanite as brown poorly crystallized masses in pegmatites which seam the magnetite deposits: 633; preliminary analyses for age determinations on allanite showed the sample studied was weathered or otherwise altered; further work planned on other available material from same pegmatites: 851.
Smith mine: allanite: 78, 82; allanite abundant in magnetite deposit: 1098.
Cook shaft: allanite in coarse pegmatite: 811; allanite in pegmatites accompanying non-titaniferous magnetites; age determinations on this allanite gave inconclusive results; chemical analysis of allanite sample gave 0.50% ThO_2 and 0.01% U_3O_8: 850.

NEW YORK (contd.)

Essex County (contd.)
Allanite Occurrences
Moriah: allanite: 950; allanite discovered by Dana; similar crystal found at Trotter mine, New Jersey: 734.
Moriah in Sanford ore bed, 6 mi. W of Port Henry: allanite with magnetite in gneiss: 1021.
Port Henry: large allanite crystals in Sanford or Old Bed group of magnetites: 811.
Whiteface Mountain: allanite: 1025; allanite in feldspar showing radial fracturing in pegmatite: 947; allanite in large crystals in coarse granite and pegmatite near the summit: 878; allanite in pegmatites in anorthosite near summit; age determinations using the ratio, Pb/U + 0.36 Th equals 0.167, gave an age of about 1200 m.y.; chemical analysis of allanite sample gave 1.20% ThO_2 and 0.08% U_3O_8: 850; age determinations on allanite, made on one sample, gave 1.069% Th (6 analyses), 0.069% U (6 analyses), age ratio 0.167, and approximate age 1100 + m.y.: 851.
Apatite, Rare Earths in:
Mineville
Old Bed, part of Mineville group of ore beds in Mineville: apatite contains unusually large percentage of Th and rare-earth elements and a little U as well; also was source of these elements found in slag at Old Colburn furnace 2½ mi. S of Mineville and caused the radioactive anomalies detected in the area; apatite occurs disseminated and in thin seams in the magnetite ore and, although transparent, is coated with hematite specks; X-ray diffraction patterns of hand-picked grains, FK-73AA, showed mineral to be fluorapatite and chemical analysis gave 0.018% U,

NEW YORK (contd.)

Essex County (contd.)
Apatite, Rare Earths in
Mineville
Old Bed, part of Mineville group of ore beds in Mineville: 0.04% Th, and 4.9% rare earths; radioactivity of ore, rock, concentrates, and tailings seems to be a function of the amount, as estimated visually, of apatite in samples and ranges from 0.001-0.015% eU and 0.001-0.004% U; testing of tailings before and after being processed to remove apatite for use as fertilizer showed that the radioactivity and the percentage of eU were both higher before the apatite had been removed: 843.
Old Bed: analyses of apatite separated from magnetite ore from Old Bed and orebody of Smith mine, show higher rare-earth, Th and U contents than reported previously; samples contained from 4.28-32.4% Re_2O_3, 0.01-0.38% ThO_2, and 0.009-0.11% U and all laboratory data indicated that they were contained in fluorapatite; samples came from Smith mine and six levels in the Old Bed and no change in mineralogy or distribution of elements appeared in different parts of mine: 995.
Smith mine: analyses of apatite separated from magnetite ore from Old Bed and orebody of Smith mine, show higher rare-earth, Th and U contents than reported previously; samples contained from 4.28-32.4% Re_2O_3, 0.01-0.38% ThO_2, and 0.009-0.11% U and all laboratory data indicated that they were contained in fluorapatite; samples came from Smith mine and six levels in the Old Bed and no change in mineralogy or distribution of elements appeared in different parts of mine: 995.

NEW YORK (contd.)

Essex County (contd.)
Apatite, Thorium-bearing
Mineville
Old Bed, part of Mineville group of ore beds in Mineville: apatite contains unusually large percentage of Th and rare-earth elements and a little U as well; also was source of these elements found in slag at Old Colburn furnace 2½ mi. S of Mineville and caused the radioactive anomalies detected in the area; apatite occurs disseminated and in thin seams in the magnetite ore and, although transparent, is coated with hematite specks; X-ray diffraction patterns of hand-picked grains, FK-73AA, showed mineral to be fluorapatite and chemical analysis gave 0.018% U, 0.04% Th, and 4.9% rare earths; radioactivity of ore, rock, concentrates, and tailings seems to be a function of the amount, as estimated visually, of apatite in samples and ranges from 0.001-0.015% eU and 0.001-0.004% U; testing of tailings before and after being processed to remove apatite for use as fertilizer showed that the radioactivity and the percentage of eU were both higher before the apatite had been removed: 843.
Old Bed: analyses of apatite separated from magnetite ore from Old Bed and orebody of Smith mine, show higher rare-earth, Th and U contents than reported previously; samples contained from 4.28-32.4% Re_2O_3, 0.01-0.38% ThO_2, and 0.009-0.11% U, and all laboratory data indicated that they were contained in fluorapatite; samples came from Smith mine and six levels in the Old Bed and no change in mineralogy or distribution of elements appeared in different parts of mine: 995.

NEW YORK (contd.)

Essex County (contd.)
Apatite, Thorium-bearing
Mineville
Smith mine: analyses of apatite separated from magnetite ore from Old Bed and orebody of Smith mine, show higher rare-earth, Th and U contents than reported previously; samples contained from 4.28-32.4% Re_2O_3, 0.01-0.38% ThO_2, and 0.009-0.11% U, and all laboratory data indicated that they were contained in fluorapatite; samples came from Smith mine and six levels in the Old Bed and no change in mineralogy or distribution of elements appeared in different parts of mine: 995.
Apatite, Uranium-bearing
Old Bed, part of Mineville group of ore beds in Mineville: apatite contains unusually large percentage of Th and rare-earth elements and a little U as well; also was source of these elements found in slag at Old Colburn furnace 2½ mi. S of Mineville and caused the radioactive anomalies detected in the area; apatite occurs disseminated and in thin seams in the magnetite ore and, although transparent, is coated with hematite specks; X-ray diffraction patterns of hand-picked grains, FK-73AA, showed mineral to be fluorapatite and chemical analysis gave 0.018% U, 0.04% Th, and 4.9% rare earths; radioactivity of ore, rock, concentrates, and tailings seems to be a function of the amount, as estimated visually, of apatite in samples and ranges from 0.001-0.015% eU and 0.001-0.004% U; testing of tailings before and after being processed to remove apatite for use as fertilizer showed that the radioactivity and the percentage of eU were both higher before the apatite had been removed: 843.

NEW YORK (contd.)

Essex County (contd.)
Apatite, Uranium-bearing
Mineville
Old Bed: analyses of apatite separated from magnetite ore from Old Bed and orebody of Smith mine, show higher rare-earth, Th, and U contents than reported previously; samples contain from 4.28-32.4% Re_2O_3, 0.01-0.38% ThO_2, and 0.009-0.11% U, and all laboratory data indicated that they were contained in fluorapatite; samples came from Smith mine and six levels in the Old Bed and no change in mineralogy or distribution of elements appeared in different parts of mine: 995.
Smith mine: analyses of apatite separated from magnetite ore from Old Bed and orebody of Smith mine, show higher rare-earth, Th, and U contents than reported previously; samples contained from 4.28-32.4% Re_2O_3, 0.01-0.38% ThO_2, and 0.009-0.11% U, and all laboratory data indicated that they were contained in fluorapatite; samples came from Smith mine and six levels in the Old Bed and no change in mineralogy or distribution of elements appeared in different parts of mine: 995.
Iron Deposits, Thorium-bearing
Adirondack Mountains
Moriah Center: analysis of iron slag showed 0.030% eU, 0.007% U, and 0.11% ThO_2, and slag contained Ca, Mg, Al, Ti, Fe, La, Na, V, Mn, B, Cs, Yt, and traces of Zr, Cd, and 0.1-1.0% Th: 875.
Mineville: apatite-rich magnetite of Old Bed ore deposit may be significant potential source of Th and rare earths; more sampling required before evaluation can be made; fluorapatite only radioactive mineral observed in tailings to date: 994.

NEW YORK (contd.)

Essex County (contd.)
Iron Deposits, Uranium-bearing
Adirondack Mountains
Moriah Center: analysis of iron slag showed 0.030% eU, 0.007% U, and 0.11% ThO_2, and slag contained Ca, Mg, Al, Ti, Fe, La, Na, V, Mn, B, Cs, Yt, and traces of Zr, Cd, and 0.1-1.0% Th: 875.
Radioactive Magnetite
Cheever: age determination tests were made on one specimen of magnetite and gave the following results: No. 1061 gave 0.28 activity by radon-thoron count and an age of 560 m.y., and 0.70 activity by direct alpha count and an age of 225 m.y., and 5.33 He: 785.
Cheever mines 2 mi. N of Port Henry $\frac{1}{4}$ mi. W of Lake Champlain: radioactivity determination on magnetic orebody in green syenitic gneiss near Grenville limestone and resembling Old Bed ore at Mineville, gave negative results; magnetic ore from dump, 0.011% eU: 843.
Close mine on farm of Hughy Close $3\frac{1}{2}$ mi. SW of Westport: radioactivity of magnetite orebody in hornblende gneiss, less than 0.03 mr/hr: 843.
Craig Harbor prospect $\frac{1}{4}$ mi. N of northern-most boathouse in Port Henry along RR tracks: radioactivity of magnetite-rich gabbro probably high in titanium, less than 0.03 mr/hr: 843.
Furnace Point, Slag dump, 1 mi. NE of Westport along W shore of Lake Champlain: radioactivity of slag dump of old iron furnace, with magnetite ore, slag and iron puddles in vicinity, and slag the only active material, 0.10 max. mr/hr for one sample and no result for other; slag from furnace, 0.018% eU and 0.006% U; magnetite ore, 0.002% eU: 843.

NEW YORK (contd.)

Essex County (contd.)

Radioactive Magnetite

Hammondville mines 10 mi. SW of Crown Point: radioactivity of ore, a magnetite-quartz-chlorite-garnet rock, less than 0.03 mr/hr.: 843.

Lake Sanford mines operated by National Lead Co. at Tahawus Club along Sanford and Henderson Lakes: radioactivity of titaniferous magnetite deposits in gabbro and Marcy anorthosite, less than 0.03 mr/hr.: 843.

Lawrence prospects on Sugar Hill 1½ mi. SW of Crown Point: radioactivity of three prospects, a "phosphate pit," pegmatite with a few grains of black radioactive mineral, and two magnetite prospects, 0.03 mr/hr.: 843.

Lincoln Pond mine, 500 ft. W of S end of Lincoln Pond: radioactivity of fine- to medium-grained magnetite-biotite-feldspar ore rock cut by a few pyrite veinlets, less than 0.03 mr/hr.: 843.

Little Pond mine, several hundred yds., N of Little Pond and 2 mi. S of Elizabethtown: radioactivity of titaniferous magnetite orebody in dark green gabbro, less than 0.03 mr/hr.: 843.

Ore Bed Point 4 mi. NE of Westport along W shore of Lake Champlain: radioactivity of magnetite-hornblende-biotite rock, presumed to be the ore, and the country rock, a hornblende gneiss, less than 0.03 mr/hr.: 843.

Smith mine on farm of Charlie Smith 3 mi. SW of Westport: radioactivity of magnetite orebody in gabbro probably high in Ti and rich in parts of garnet and amphibole, less than 0.03 mr/hr.: 843.

Vineyard mine at NE foot of Buck Mountain along Crown Point Street, 2½ mi. S of Crown Point: radioactivity of magnetite orebody in Grenville

NEW YORK (contd.)

Essex County (contd.)

Radioactive Magnetite

Vineyard mine at NE foot of Buck Mountain along Crown Point Street, 2½ mi. S of Crown Point: hornblende gneiss, less than 0.03 mr/hr.: 843.

Radioactive Minerals

Port Henry: helium and radioactivity data for: magnetite, 9.7×10^{-5}cc. He/g. and average activity of 1.31 alphas/mg/hr.; hedenbergite, 336.0×10^{-5}cc. He/g., 82 alphas/mg/hr.: 798.

Radioactive Rocks

Adirondack Mountains

Ausable Chasm, U.S. Highway 9, 0.5 mi. NE of bridge in: radioactivity of glacial cover and fill in Cambrian Potsdam sandstone area, estimated as 0.003-0.004% eU: 875.

Chilson, New York Highway 73 at: radioactivity of gneiss and glacial cover in hornblende gneiss area, average estimated as 0.003% eU: 875.

Chilson, New York Highway 73, 1.3 mi. W of: radioactivity of marble and glacial cover in Grenville limestone area, estimated as 0.003-0.004% eU, with glacial cover averaging 0.001-0.002% eU with a maximum of 0.005% eU: 875.

Chilson, New York Highway 73, 4.3 mi. W of: radioactivity of dark gneissic rocks in granite area, estimated as 0.002-0.003% eU: 875.

Chilson, New York Highway 73, 4.8 mi. W of: radioactivity of long outcrop of gneissic rocks in granite area, average estimated as 0.004% eU; and at 3.5 mi. W of Chilson activity is estimated as 0.002-0.004% eU: 875.

NEW YORK (contd.)

Essex County (contd.)
Radioactive Rocks
Adirondack Mountains

Keene, New York Highway 86A, 7.8 mi. W of: radioactivity of glacial cover on syenite area, estimated as 0.001-0.003% eU: 875.

Lake Placid, New York Highway 86, 6.8 mi. N of junction with New York Highway 86A in: radioactivity of large outcrop of gneiss in area of granite, a very quartzose phase of the syenite, average estimated as 0.004% eU: 875.

Lake Placid, New York Highway 86 continuous for a few miles S of junction with New York Highway 86A in: radioactivity of glacial cover, estimated as 0.001-0.003% eU; bedrock N and E of, mainly syenite and Grenville gneiss which forms a pocket in anorthosite: 875.

Mineville and Witherbee, Unnumbered road between: radioactivity of glacial cover or tailings, probably all mine dump materials used in road fills, estimated as 0.002-0.006% eU: 875.

Moriah Center road intersection: radioactivity of glacial cover on syenite area, probably fill material from iron mine dumps, estimated as 0.002-0.003% eU: 875.

Plattsburg, New York Highway 3/365, about 2 mi. W of junction with New York Highway 22 in: radioactivity of glacial cover on area of Lower Ordovician Beekmantown sediments, estimated as 0.001-0.004% eU with average estimated as +- 0.001% eU: 875.

Port Henry, New York Highway 8, 2.4 mi. S of traffic circle in: radioactivity of gneiss in area of granite and related types, average estimated as 0.003% eU: 875.

NEW YORK (contd.)

Essex County (contd.)
Radioactive Rocks
Adirondack Mountains

Port Henry, New York Highway 22, 0.7 mi. N of traffic circle in: radioactivity of long outcrop of limestone and hornblende schist in Grenville schists and gneisses, estimated as 0.001-0.003% eU: 875.

Port Henry, New York Highway 22, 2.1 mi. N of traffic circle in: radioactivity of glacial cover on Grenville schists, gneiss, and limestone, estimated as 0.003-0.004% eU: 875.

Port Henry, New York Highway 22, 2.4 mi. N of traffic circle in: radioactivity of gneiss in Grenville limestone area, estimated as 0.002-0.003% eU: 875.

Port Henry, New York Highway 22, 3.2 mi. N of traffic circle in: radioactivity of dark limestone in Grenville limestone area, estimated as 0.003-0.004% eU: 875.

Severance, New York Highway 73, 5.6 mi. E of junction with New York Highway 9 near: radioactivity of limestone in Grenville limestone area, estimated as 0.002-0.003% eU with average estimated as +- 0.001% eU; and, at points 6.0 and 6.8 mi. E of this junction, activity is estimated as 0.002-0.004% eU: 875.

Ticonderoga, New York Highway 22, 1.5 mi. S of junction with New York Highway 347 in: radioactivity of light-colored granite gneiss in syenite area, estimated as 0.002-0.004% eU: 875.

Ticonderoga, New York Highway 22, 5.6 mi. S of junction with New York Highway 347 in: radioactivity of light gray granite gneiss in area of Grenville garnet gneiss and other gneisses, average estimated as 0.003% eU: 875.

NEW YORK (contd.)

Essex County (contd.)
Radioactive Rocks
Adirondack Mountains
Ticonderoga, New York Highway 22, 8.2 mi. S of junction with New York Highway 347 in: radioactivity of gray and pink gneiss in area of Grenville garnet gneiss and other gneisses, estimated as 0.002-0.004% eU: 875.
Ticonderoga, New York Highway 73, 1.3 mi. W of junction with New York Highway 8 near: radioactivity of long outcrop of gray gneiss in area of garnet gneiss and banded gneiss, estimated as 0.002-0.004% eU: 875.
Upper Jay, New York Highway 9N, 1.0 mi. N of bridge over East Branch of Ausable River in: radioactivity of glacial cover on approximately the contact of Marcy and White Face anorthosites, average estimated as 0.003% eU: 875.
Ledge Hill roadcut 2 mi. SW of Westport: radioactivity of silicified granite gneiss with little pyrite and altered feldspar and only silicified part active, less than 0.10 max. mr/hr; silicified granite gneiss, 0.005% eU: 843.
St. Huberts, deep road cut near: radioactivity determinations on crystal of labradorite from Adirondack anorthosite gave 1.22 x 10^{-5}cc. He/g., 1.09 x 10^{-13}g. Ra/g., 1.16 x 10^{-6}g. Th/g., age 168 m.y.: 746.
Rare Earths Occurrences
Mineville
Old Bed, part of Mineville group of ore beds in Mineville: apatite contains unusually large percentage of Th and rare-earth elements and a little U as well; also was source of these elements found in slag at Old Colburn furnace 2½ mi. S. of Mineville and caused the radioactive

NEW YORK (contd.)

Essex County (contd.)
Rare Earths Occurrences
Mineville
Old Bed, part of Mineville group of ore beds in Mineville: anomalies detected in the area; apatite occurs disseminated and in thin seams in the magnetite ore and, although transparent, is coated with hematite specks; X-ray diffraction patterns of hand-picked grains, FK-73AA, showed mineral to be fluorapatite and chemical analysis gave 0.018% U, 0.04% Th, and 4.9% rare earths; radioactivity of ore, rock, concentrates, and tailings seems to be a function of the amount, as estimated visually, of apatite in samples and ranges from 0.001-0.015% eU and 0.001-0.004% U; testing of tailings before and after being processed to remove apatite for use as fertilizer showed that the radioactivity and the percentage of eU were both higher before the apatite had been removed: 843.
Old Bed: analyses of apatite separated from magnetite ore from Old Bed and orebody of Smith mine, show higher rare-earth, Th, and U contents than reported previously; samples contained from 4.28-32.4% Re_2O_3, 0.01-0.38% ThO_2, and 0.009-0.11% U, and all laboratory data indicated that they were contained in fluorapatite; samples came from Smith mine and six levels in the Old Bed and no change in mineralogy or distribution of elements appeared in different parts of mine: 995.
Smith mine: analyses of apatite separated from magnetite ore from Old Bed and orebody of Smith mine, show higher rare-earth, Th, and U contents than

NEW YORK (contd.)

Essex County (contd.)
Rare Earths Occurrences
Mineville
Smith mine:
reported previously; samples contained from 4.28-32.4% Re_2O_3, 0.01-0.38% ThO_2, and 0.009-0.11% U, and all laboratory data indicated that they were contained in fluorapatite; samples came from Smith mine and six levels in the Old Bed and no change in mineralogy or distribution of elements appeared in different parts of mine: 995.
Thorium Occurrences
General: allanite: 249
Adirondack magnetite deposits: allanite in pegmatites which seam the iron deposits: 633.
Adirondack Mountains
Moriah Center: analysis of iron slag showed 0.030% eU, 0.007% U, and 0.11% ThO_2, and slag contained Ca, Mg, Al, Ti, Fe, La, Na, V, Mn, B, Cs, Yt, and traces of Zr, Cd, and 0.1-1.0% Th: 875.
Breeds Hill S of Crown Point village about 1 mi. from Lake Champlain: allanite in pegmatite body opened by Crown Point Spar Co. for feldspar mining: 880.
Champlain iron region: uranothorite with 10% U oxide found as a single massive dark red specimen, exact location unknown: 720.
Crown Point: allanite abundant in biotite gneiss: 807.
Crown Point Spar Co. quarry on Breeds Hill S of Crown Point and about 1 mi. from and 500 ft. above shore of Lake Champlain: pegmatite boss quarried for feldspar but also contains small amounts of biotite and occasional crystals of titanite, magnetite, zircon, tourmaline, pyrite, chalcopyrite, and allanite: 879.

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Essex County (contd.)
Thorium Occurrences
Delano: large pegmatite vein in rocky cliff NW of steamboat landing, contains abundant allanite in certain portions: 807.
Delano on N side of Mount Defiance: allanite crystals in pegmatite: 880.
Hammond Iron Mine, Hammondville: allanite associated with magnetite in quartz showing radial fracturing: 947.
Mineville: allanite as brown poorly crystallized masses in pegmatites which seam the magnetite deposits: 633; preliminary analyses for age determinations of allanite showed the sample studied was weathered or otherwise altered; further work planned on other available material from same pegmatites: 851; apatite-rich magnetite of Old Bed ore deposit may be significant potential source of Th and rare earths; more sampling required before evaluation can be made; fluorapatite only radioactive mineral observed in tailings to date: 994.
Old Bed, part of Mineville group of ore beds in Mineville: apatite contains unusually large percentage of Th and rare-earth elements and a little U as well; also was source of these elements found in slag at Old Colburn furnace 2½ mi. S of Mineville and caused the radioactive anomalies detected in the area; apatite occurs disseminated and in thin seams in the magnetite ore and, although transparent, is coated with hematite specks; X-ray diffraction patterns of hand-picked grains, FK-73AA, showed mineral to be fluorapatite and chemical analysis gave 0.018% U, 0.04% Th, and 4.9% rare earths; radioactivity of

NEW YORK (contd.)

Essex County (contd.)
Thorium Occurrences
Mineville
Old Bed, part of Mineville group of ore beds in Mineville: ore, rock, concentrates, and tailings seems to be a function of the amount, as estimated visually, of apatite in samples and ranges from 0.001-0.015% eU and 0.001-0.004% U; testing of tailings before and after being processed to remove apatite for use as fertilizer showed that the radioactivity and the percentage of eU were both higher before the apatite had been removed: 843.
Old Bed: analyses of apatite separated from magnetite ore from Old Bed and orebody of Smith mine, show higher rare-earth, Th, and U contents than reported previously; samples contained from 4.28-32.4% Re_2O_3, 0.01-0.38% ThO_2, and 0.009-0.11% U, and all laboratory data indicated that they were contained in fluorapatite; samples came from Smith mine and six levels in the Old Bed and no change in mineralogy or distribution of elements appeared in different parts of mine: 995.
Smith mine: allanite: 78, 82; allanite abundant in magnetite deposit: 1098; analyses of apatite separated from magnetite ore from Old Bed and orebody of Smith mine, show higher rare-earth, Th, and U contents than reported previously; samples contained from 4.28-32.4% Re_2O_3, 0.01-0.38% ThO_2, and 0.009-0.11% U, and all laboratory data indicated that they were contained in fluorapatite; samples came from Smith mine and six levels in the Old Bed and no change in mineralogy or distribution of elements appeared in different parts of mine: 995.
Cook shaft: allanite in coarse pegmatite: 811; allanite in pegmatites accompanying nontitaniferous magnetites; age

NEW YORK (contd.)

Essex County (contd.)
Thorium Occurrences
Mineville
Smith mine
Cook Shaft:
determinations on this allanite gave inconclusive results; chemical analysis of allanite sample gave 0.50% ThO_2 and 0.01% U_3O_8: 850.
Moriah: allanite: 950; allanite discovered by Dana; similar crystal found at Trotter mine, New Jersey: 734.
Moriah in Sanford ore bed, 6 mi. W of Port Henry: allanite with magnetite in gneiss: 1021.
Port Henry: large allanite crystals in Sanford or Old Bed group of magnetites: 811; uranothorite: 1098.
Whiteface Mountain: allanite: 1025; allanite in feldspar showing radial fracturing in pegmatite: 947; allanite in large crystals in coarse granite and pegmatite near the summit: 878; allanite in pegmatites in anorthosite near summit; age determinations using the ratio, Pb/U + 0.36 Th equals 0.167, gave an age of about 1200 m.y.; chemical analysis of allanite sample gave 1.20% ThO_2 and 0.08% U_3O_8: 850; age determinations on allanite, made on one sample, gave 1.069% Th (6 analyses), 0.069% U (6 analyses), age ratio 0.167, and approximate age 1100 + m.y.: 851.
Apatite, Thorium-bearing
Mineville
Old Bed, part of Mineville group of ore beds in Mineville: apatite contains unusually large percentage of Th and rare-earth elements and a little U as well; also was source of these elements found in slag at Old Colburn furnace 2½ mi. S of Mineville and caused the radioactive anomalies detected in the area; apatite occurs

NEW YORK (contd.)

Essex County (contd.)
Thorium Occurrences
Apatite, Thorium-bearing
Mineville
Old Bed, part of Mineville group of ore beds in Mineville: disseminated and in thin seams in the magnetite ore and, although transparent, is coated with hematite specks; X-ray diffraction patterns of hand-picked grains, FK-73AA, showed mineral to be fluorapatite and chemical analysis gave 0.018% U, 0.04% Th, and 4.9% rare earths; radioactivity of ore, rock, concentrates, and tailings seems to be a function of the amount, as estimated visually, of apatite in samples and ranges from 0.001-0.015% eU and 0.001-0.004% U; testing of tailings before and after being processed to remove apatite for use as fertilizer showed that the radioactivity and the percentage of eU were both higher before the apatite had been removed: 843.
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NEW YORK (contd.)

Essex County (contd.)
Thorium Occurrences
Apatite, Thorium-bearing
Mineville
Smith mine:
contained from 4.28-32.4% Re_2O_3, 0.01-0.38% ThO_2, and 0.009-0.11% U, and all laboratory data indicated that they were contained in fluorapatite; samples came from Smith mine and six levels in the Old Bed and no change in mineralogy or distribution of elements appeared in different parts of mine: 995.
Iron Deposit, Thorium-bearing
Adirondack Mountains
Moriah Center: analysis of iron slag showed 0.030% eU, 0.007% U, and 0.11% ThO_2, and slag contained Ca, Mg, Al, Ti, Fe, La, Na, V, Mn, B, Cs, Yt, and traces of Zr, Cd, and 0.1-1.0% Th: 875.
Mineville: apatite-rich magnetite of Old Bed ore deposit may be significant potential source of Th and rare earths; more sampling required before evaluation can be made; fluorapatite only radioactive mineral observed in tailings to date: 994.
Uranium Occurrences
Adirondack Mountains
Moriah Center: analysis of iron slag showed 0.030% eU, 0.007% U, and 0.11% ThO_2, and slag contained Ca, Mg, Al, Ti, Fe, La, Na, V, Mn, B, Cs, Yt, and traces of Zr, Cd, and 0.1-1.0% Th: 875.
Champlain iron region: uranothorite with 10% U oxide found as a single massive dark red specimen, exact location unknown: 720.
Mineville: preliminary analyses for age determinations on allanite showed the sample studied was weathered or otherwise altered; further work planned on other

NEW YORK (contd.)

Essex County (contd.)
Uranium Occurrences
Mineville:
available material from same pegmatite: 851.
Old Bed, part of Mineville group of ore beds in Mineville: apatite contains unusually large percentage of Th and rare-earth elements and a little U as well; also was source of these elements found in slag at Old Colburn furnace $2\frac{1}{2}$ mi. S of Mineville and caused the radioactive anomalies detected in the area; apatite occurs disseminated and in thin seams in the magnetite ore and, although transparent, is coated with hematite specks; X-ray diffraction pattern of hand-picked grains, FK-73AA, showed mineral to be fluorapatite and chemical analysis gave 0.018% U, 0.04% Th, and 4.9% rare earths; radioactivity of ore, rock, concentrates, and tailings seems to be a function of the amount, as estimated visually, of apatite in samples and ranges from 0.001-0.015% eU and 0.001-0.004% U; testing of tailings before and after being processed to remove apatite for use as fertilizer showed that the radioactivity and the percentage of eU were both higher before the apatite had been removed: 843.
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NEW YORK (contd.)

Essex County (contd.)
Uranium Occurrences
Mineville
Old Bed:
mine and six levels in the Old Bed and no change in mineralogy or distribution of elements appeared in different parts of mine: 995.
Smith mine: analyses of apatite separated from magnetite ore from Old Bed and orebody of Smith mine, show higher rare-earth, Th, and U contents than reported previously; samples contained from 4.28-32.4% Re_2O_3, 0.01-0.38% ThO_2, and 0.009-0.11% U, and all laboratory data indicated that they were contained in fluorapatite; samples came from Smith mine and six levels in the Old Bed and no change in mineralogy or distribution of elements appeared in different parts of mine: 995.
Cook Shaft: allanite in pegmatites accompany nontitaniferous magnetites; age determinations on this allanite gave inconclusive results; chemical analysis of allanite sample gave 0.50% ThO_2 and 0.01% U_3O_8: 850.
Port Henry: uranothorite: 1098.
Whiteface Mountain: allanite in pegmatites in anorthosite near summit; age determinations by using the ratio, Pb/U + 0.36 Th equals 0.167, gave an age of about 1200 m.y.; chemical analysis of allanite sample gave 1.20% ThO_2 and 0.08% U_3O_8: 850; age determinations on allanite, made on one sample, gave 1.069% Th (6 analyses), 0.069% U (6 analyses), age ratio 0.167, and approximate age 1100 + m.y.: 851.

NEW YORK (contd.)

Essex County (contd.)
Uranium Occurrences
Apatite, Uranium-bearing
Mineville
Old Bed, part of Mineville group of ore beds in Mineville: apatite contains unusually large percentage of Th and rare earth elements and a little U as well; also was source of these elements found in slag at Old Colburn furnace 2½ mi. S of Mineville and caused the radioactive anomalies detected in the area; apatite occurs disseminated and in thin seams in the magnetite ore and, although transparent, is coated with hematite specks; X-ray diffraction patterns of hand-picked grains, FK-73AA, showed mineral to be fluorapatite and chemical analysis gave 0.018% U, 0.04% Th, and 4.9% rare earths; radioactivity of ore, rock, concentrates, and tailings seems to be a function of the amount, as estimated visually, of apatite in samples and ranges from 0.001-0.015% eU and 0.001-0.004% U; testing of tailings before and after being processed to remove apatite for use as fertilizer showed that the radioactivity and the percentage of eU were both higher before the apatite had been removed: 843.
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NEW YORK (contd.)

Essex County (contd.)
Uranium Occurrences
Apatite, Uranium-bearing
Mineville
Old Bed:
change in mineralogy or distribution of elements appeared in different parts of mine: 995.
Smith mine: analyses of apatite separated from magnetite ore from Old Bed and orebody of Smith mine, show higher rare-earth, Th, and U contents than reported previously; samples contained from 4.28-32.4% Re_2O_3, 0.01-0.38% ThO_2, and 0.009-0.11% U, and all laboratory data indicated that they were contained in fluorapatite; samples came from Smith mine and six levels in the Old Bed and no change in mineralogy or distribution of elements appeared in different parts of mine: 995.
Iron Deposit, Uranium-bearing
Adirondack Mountains
Moriah Center: analysis of iron slag showed 0.030% eU, 0.007% U, and 0.11% ThO_2, and slag contained Ca, Mg, Al, Ti, Fe, La, Na, V, Mn, B, Cs, Yt, and traces of Zr, Cd, and 0.1-1.0% Th: 875.
Uranothorite Occurrences
Champlain iron region: uranothorite with 10% U oxide found as a single massive dark red specimen, exact location unknown: 720.
Port Henry: uranothorite: 1098.

(See also Essex and Hamilton Counties: 644.)

NEW YORK (contd.)

Essex and Hamilton Counties
Allanite Occurrences
Newcomb quadrangle: allanite in Grenville mixed gneisses, sporadically in isolated grains surrounded by radial cracks: 644.
Thorium Occurrences
Newcomb quadrangle: allanite in Grenville mixed gneisses sporadically in isolated grains surrounded by radial cracks: 644.

Franklin County
Allanite Occurrences
Adirondack Mountains
Talcville: analysis of pegmatite sample showed 0.050% eU, 0.043% U, and 0.02% ThO_2, and it contained traces of weakly radioactive allanite and very radioactive uraninite: 875.
Radioactive Rocks
Adirondack Mountains
Barton Hill, Mine dump at Republic Steel mine N of: radioactivity of tailings dump in syenite area, average estimated as 0.004% eU: 875.
Duane, New York Highway 10, about 3.7 to 8.0 mi. N of junction with New York Highway 99 in: radioactivity of glacial cover on area of metagabbro and pyroxene-hornblende quartz syenite and glacial material, average estimated as 0.004% eU: 875.
Duane, New York Highway 10, 8 mi. N of: radioactivity of amphibolite gneiss and pegmatite in area of metagabbro and amphibolite, estimated as 0.006-0.008% eU: 875.
Duane, New York Highway 10, 10.9 mi. N of: radioactivity of glacial cover on area of metagabbro and amphibolite, average estimated as 0.004% eU: 875.

NEW YORK (contd.)

Franklin County (contd.)
Radioactive Rocks
Adirondack Mountains
St. Regis Falls, New York Highway 10, from a point 5.6 mi. S of Duane and then NE on New York Highway 72 to 1.0 mi. W of: radioactivity of glacial cover on area mostly glacial with some St. Regis granite and various quartz syenites, estimated as 0.003-0.004% eU; outcrops along this traverse showed 0.002% eU: 875.
St. Regis Falls, Unnumbered road to Dickinson Center, 2.0 mi. N of: radioactivity of glacial cover on gneiss area, average estimated as 0.003% eU: 875.
Tupper Lake, New York Highways 10 and 365, 6.4 mi. S of junction with New York Highway 3 in: radioactivity of glacial cover on augite gneiss area, average estimated as 0.001% eU, while at a point 8.7 mi. S of junction, activity of granite, in augite syenite area, is estimated as 0.004% eU: 875.
Thorium Occurrences
Adirondack Mountains
Duane: analysis of pegmatite sample showed 0.140% eU, 0.005% U, and 0.62% ThO_2, and it contained traces of xenotime, zircon and pyrite, all weakly radioactive; analysis of a second pegmatite sample showed 0.100% eU, 0.004% U, and 0.52% ThO_2, and it contained traces of magnetite and weakly radioactive pyrite: 875.
Uranium Occurrences
Adirondack Mountains
Duane: analysis of pegmatite sample showed 0.140% eU, 0.005% U, and 0.62% ThO_2, and it contained traces of xenotime, zircon, and pyrite, all weakly radioactive; analysis of a second pegmatite sample showed 0.100% eU, 0.004%

NEW YORK (contd.)

Franklin County (contd.)
Uranium Occurrences
Adirondack Mountains
Duane:
U, and 0.52% ThO_2, and it contained traces of magnetite and weakly radioactive pyrite: 875.
Xenotime Occurrences
Adirondack Mountains
Duane: analysis of pegmatite sample showed 0.140% eU, 0.005% U, and 0.62% ThO_2, and it contained traces of xenotime, zircon, and pyrite, all weakly radioactive; analysis of a second pegmatite sample showed 0.100% eU, 0.004% U, and 0.52% ThO_2, and it contained traces of magnetite and weakly radioactive pyrite: 875.

Fulton County
Radioactive Rocks
Adirondack Mountains
Bleecker, Unnumbered road to, at points 10.1 and 3.7 mi. NW of bridge at Northville: radioactivity of glacial cover on Adirondack gneiss, estimated as 0.002-0.003% eU with average estimated as 0.001% eU: 875.
Bleecker, Unnumbered road 3 mi. N of: radioactivity of glacial cover on Adirondack gneiss, estimated as 0.004% eU with average estimated as + - 0.001% eU: 875.
Bleecker, Unnumbered road 4.2 mi. N of: radioactivity of Adirondack gneiss, estimated as 0.002-0.003% eU: 875.
Northville, New York Highway 30, 5.0 and 9.8 mi. N of: radioactivity of Adirondack gneiss, estimated as 0.002-0.004% eU: 875.

NEW YORK (contd.)

Fulton County (contd.)
Radioactive Rocks
Adirondack Mountains
Stratford, New York Highway 10, 2.1 mi. N of junction with New York Highway 29A at: radioactivity of poorly banded, sheared, and crushed gneiss in Adirondack gneiss, average estimated as 0.003% eU: 875.
Stratford, New York Highway 29A, 5.9 mi. E of: radioactivity of banded gneiss in Adirondack gneiss, average estimated as 0.003% eU: 875.
Geophysical Exploration (Airborne)
See under individual county names and under Index III, Geophysical Exploration(Airborne)-New York: 1086.

Geophysical Exploration (Ground)
See under individual county names and under Index III, Geophysical Exploration (Ground)-New York: 875.

Greene County
Black Shale, Uranium-bearing
Medway, 3 mi. SE of, in ravine on N side of old road, 1 mi. SSW of Roberts Hill: radioactivity of Bakeoven black shale of Middle Devonian age, estimated radioactivity of entire stratigraphic section found in traverse on foot, 0.002-0.003% eU; grab sample contained 0.002% eU and 0.001% U by chemical analysis: 875.
Uranium Occurrences
Medway, 3 mi. SE of, in ravine on N side of old road, 1 mi. SSW of Roberts Hill: radioactivity of Bakeoven black shale of Middle Devonian age, estimated radioactivity of entire stratigraphic section found in traverse on foot, 0.002-0.003% eU; grab sample contained 0.002% eU and 0.001% U, by chemical analysis: 875.

NEW YORK (contd.)

Greene County (contd.)
Uranium Occurrences
Black Shale, Uranium-bearing
Medway, 3 mi. SE of, in ravine on N side of old road, 1 mi. SSW of Roberts Hill: radioactivity of Bakeoven black shale of Middle Devonian age, estimated radioactivity of entire stratigraphic section found in traverse on foot, 0.002-0.003% eU; grab sample contained 0.002% eU and 0.001% U by chemical analysis: 875.

Gummite Occurrences
See under individual county names and under Index III, Gummite Occurrences-New York: 675, 846, 1032, 1094, 1098.

Hamilton County
Radioactive Rocks
Adirondack Mountains
Blue Mountain Lake on New York Highway 28: radioactivity of glacial cover on mixture of glacial material and Grenville series, estimated as 0.001-0.004% eU with average estimated as 0.002% eU: 875.
Blue Mountain Lake, New York Highway 28, 0.4 mi. E of: radioactivity of glacial cover on Grenville syenite and granite, mixed gneisses, estimated as 0.001-0.004% eU with average estimated as 0.001% eU: 875.
Blue Mountain Lake, New York Highway 28, 5.3 mi. W of: radioactivity of glacial cover on quartz syenite, average estimated as 0.003% eU: 875.
Indian Lake, New York Highway 10, 2.1 mi. S of: radioactivity of dark micaceous gneiss in Grenville syenite and granite, mixed gneisses, estimated as 0.002-0.003% eU: 875.

NEW YORK (contd.)

Hamilton County (contd.)
Radioactive Rocks
Adirondack Mountains
Indian Lake, New York Highway 28, 2.3 - 4.2 mi. E of: radioactivity of scattered outcrops of dark gneissic rock in syenite, granite, and garnetiferous gabbro, estimated as 0.002-0.003% eU with average estimated as + - 0.001% eU: 875.
Indian Lake, New York Highway 28, 4.2 - 6.7 mi. E of: radioactivity of glacial cover on area of glacial material, gabbro, and Grenville limestone, estimated as 0.001-0.003% eU with average estimated as + - 0.001% eU: 875.
Long Lake, New York Highways 10 and 365, 5.9 mi. N of junction with New York Highway 28 in: radioactivity of Adirondack gneiss, average estimated as 0.004% eU: 875.
Long Lake, New York Highways 10 and 365, 8.8 mi. N of junction with New York Highway 22 in: radioactivity of long outcrop of gray granite gneiss with small pegmatite bodies in Adirondack gneiss area, estimated as 0.002-0.005% eU: 875.
Long Lake, New York Highway 28N, 2.1 mi. E of junction with New York Highways 10 and 365 in: radioactivity of gneiss and glacial cover in area of granite, a gneissoid, very quartzose phase of the syenite, estimated as 0.003-0.004% eU with average estimated as 0.002% eU: 875.
Long Lake, New York Highway 28N, 4.0 mi. E of: radioactivity of gneiss in area of granite, a gneissoid, very quartzose phase of the syenite, average estimated as 0.003% eU: 875.

NEW YORK (contd.)

Hamilton County (contd.)
Radioactive Rocks
Adirondack Mountains
Pisceo, New York Highway 8, 0.4 mi. W of junction with New York Highway 10 near: radioactivity of red granite gneiss in granite, estimated as 0.002-0.004% eU: 875.
Pisceo, New York Highway 8, 1.3-1.4 mi. W of junction with New York Highway 10 near: radioactivity of glacial cover on granite, estimated as 0.002-0.004% eU: 875.
Pisceo, at junction of New York Highways 10 and 8: radioactivity of glacial cover on granite, estimated as 0.001-0.003% eU: 875.
Pisceo, New York Highway 10, 1.4 mi. S of junction with New York Highway 8 at: radioactivity of granite from fresh roadcut, where most of outcrop contained about 0.001% eU, estimated as 0.001-0.004% eU with average estimated as ≠ - 0.001% eU: 875.
Speculator, New York Highway 8, 3.5 mi. E of: radioactivity of gneiss in Adirondack gneiss, average estimated as 0.003% eU: 875.
(See also Essex and Hamilton Counties: 644).

Herkimer County
Radioactive Magnetite
Salisbury: age determination tests were made on two specimens of magnetite and gave the following results: No. 1051 gave 0.39 activity by radon-thoron count and an age of 540 m.y., and 0.455 activity by direct alpha count and an age of 470 m.y., and 7.25 He; No. 1069 gave 0.26 activity by radon-thoron count and an age of 500 m.y., and 0.31 activity by direct alpha count and an age of 415 m.y., and 4.36 He: 785.

NEW YORK (contd.)

Herkimer County (contd.)
Radioactive Rocks
Adirondack Mountains
McKeever, New York Highway 28, 2.5 mi. S of: radioactivity of pink and gray gneiss in Adirondack gneiss, estimated as 0.002-0.003% eU: 875.
Wilmurt, New York Highway 8, 1.8 mi. E of: radioactivity of glacial cover on Adirondack gneiss, average estimated as 0.003% eU: 875.
Wilmurt, New York Highway 8, 2.9 mi. W of: radioactivity of glacial cover and sand dunes on Adirondack gneiss, average estimated as 0.003% eU: 875.
Wilmurt, Unnumbered dirt road N of Hinckley Reservoir, 8 mi. W of: radioactivity of glacial cover with local highs on syenite in Grenville gneiss, estimated as 0.003-0.004% eU: 875.
Wilmurt, Unnumbered road 2 mi. S of: radioactivity of glacial cover on Adirondack gneiss, average estimated as 0.003% eU: 875.

Iron Deposits, Thorium-bearing
See under individual county names and under Index III, Iron Deposits, Thorium-bearing-New York: 875, 994, 996, 1005, 1034, 1103.

Iron Deposits, Uranium-bearing
See under individual county names and under Index III, Iron Deposits, Uranium-bearing-New York: 841, 875, 883, 996, 1005, 1034, 1103.

Jefferson County
Allanite Occurrences
Hammond quadrangle: allanite as an accessory mineral in the Payne Lake granite: 683.

NEW YORK (contd.)

Jefferson County (contd.)
Radioactive Rocks
Adirondack Mountains
Antwerp, New York Highway 11, 2.4-2.5 mi. SW of junction with New York Highway 26 in: radioactivity of gneiss in long outcrop of biotite garnet gneiss, estimated as 0.001-0.003% eU with average estimated as ≠ - 0.001% eU: 875.
Antwerp, New York Highway 26, 1.6 mi. W of junction with New York Highway 11 in: radioactivity of granite in what is probably contact of Hermon granite and crystalline limestone with pegmatite, estimated as 0.004% eU with average estimated as less than 0.001% eU: 875.
Antwerp, Unnumbered road to Balmat, 1.4 mi. E of junction with New York Highway 26, S of: radioactivity of gneissoid granite in Hermon-type porphyritic granite, estimated as 0.000-0.003% eU: 875.
Oxbow-Wegatchie road, Unnumbered road 2.6 mi. S of junction with: radioactivity of glacial cover on Potsdam sandstone of Cambrian age, estimated as 0.004% eU in a local high, with average estimated as less than 0.001% eU: 875.
Theresa, Unnumbered road 8.5 mi. NE of junction with New York Highway 26, W of: radioactivity of gneiss in Hermon-type granite, estimated as 0.002-0.003% eU: 875.
Philadelphia, Unnumbered road 1.1 - 1.3 mi. SW of junction with New York Highway 11, S of: radioactivity of glacial cover on granite, estimated as 0.002-0.003% eU with average estimated as ≠ - 0.001% eU: 875.
Thorium Occurrences
Hammond quadrangle: allanite as an accessory mineral in the Payne Lake granite: 683.

NEW YORK (contd.)

Kings County
See Bronx-Kings-New York-Queens-Richmond Counties: 846.

Lewis County
Radioactive Rocks
Adirondack Mountains
Crystal Dale, Unnumbered road, 5.2 mi. S of Kirschnerville near: radioactivity of dark gneissic granite in equigranular augite syenite, estimated as 0.002-0.003% eU: 875.
Harrisville, New York Highway 3, 0.6 mi. E of bridge in: radioactivity of gneiss and schist in augite syenite gneiss, estimated as 0.001-0.003% eU: 875.
Harrisville, New York Highway 3, 4.4 -4.6 mi. SW of: radioactivity of glacial cover on pyroxene syenite, estimated as 0.001-0.003% eU with average estimated as 0.001% eU: 875.
Indian River, Unnumbered road, 3.3 mi. N of: radioactivity of glacial cover on grano-syenite gneiss, estimated as 0.002-0.003% eU with average estimated as 0.002% eU: 875.
Indian River, Unnumbered road, 4.2 mi. N of: radioactivity of gray granite in grano-syenite gneiss, average estimated as 0.003% eU: 875.
Inlet, New York Highway 28, 1.7 and 5.0 mi. W of: radioactivity of Adirondack gneiss, average estimated as 0.003% eU: 875.
Lyons Falls, Unnumbered road E of Moose River 0.7 mi. N of: radioactivity of glacial cover on gneissoid rocks of various types, mostly Grenville metasediments much cut by syenite, estimated as 0.002-0.004% eU: 875.

NEW YORK (contd.)

Lewis County (contd.)
Radioactive Rocks
Adirondack Mountains
Lyon Falls, Unnumbered road E of Moose River, 1.4 mi. N of: radioactivity of medium- to coarse-grained red granite in gneissoid rocks of various types, mostly Grenville metasediments much cut by syenite, estimated average as 0.006% eU; accessory minerals are hornblende, biotite, magnetite and fluorite, and there are many quartz-feldspar pegmatite veins: highest radioactivity measured with beta-gamma tube was 0.010% eU and was associated with finer-grained zones: 875.
Natural Bridge, New York Highway 3, about 3 mi. E of: radioactivity of Grenville gneiss, estimated as 0.002-0.003% eU: 875.
Old Forge, New York Highway 28 at 0.5, 1.7, 2.0, and 2.2 mi. E of: radioactivity of Adirondack gneiss, estimated as 0.002-0.003% eU with average estimated as + - 0.001% eU: 875.
Old Forge, New York Highway 28, 3.4 mi. E of: radioactivity of glacial cover on Adirondack gneiss, average estimated as 0.003% eU: 875.
Port Leyden, Unnumbered dirt road to McKeever 6.9 mi. E of: radioactivity of glacial cover on Adirondack gneiss, estimated as 0.002-0.003% eU, and at a point 12.2 - 12.3 mi. E of Port Leyden, as 0.002-0.004% eU: 875.

Magnetite, Thorium-bearing
See under individual county names and under Index III, Magnetite, Thorium-bearing-New York: 843.

Magnetite, Uranium-bearing
See under individual county names and under Index III, Magnetite, Uranium-bearing-New York: 843, 995, 1107.

NEW YORK (contd.)

Microlite Occurrences
See under individual county names and under Index III, Microlite Occurrences-New York: 693, 768, 845, 846.

Monazite Occurrences
See under individual county names and under Index III, Thorium Occurrences-New York: 11, 104, 652, 663, 676, 693, 749, 768, 775, 784, 839, 842, 846, 884, 950, 960, 985, 1021, 1098.

Monroe County
Monazite Occurrences
Rochester: monazite, trace: 11.
Radioactive Rocks
Densmore Creek, 100 yds. downstream from Irondequoit: radiometric analyses made in laboratory for following samples: Furnaceville iron ore member of Clinton formation, a hematitic limestone in which fossils are replaced by hematite, radioactivity of 9 in. channel sample 0.001% eU; no analysis for U or P_2O_5: 935; Maplewood shale member of Clinton formation, black phosphate nodules from lower part of shale, radioactivity of grab sample, 0.003% eU; no analysis for U or P_2O_5: 935.
Genesee River gorge at Rochester: radiometric analyses made in the laboratory for the following samples: Furnaceville iron ore member of Clinton formation, a hematitic limestone in which fossils are replaced by hematite, radioactivity of grab sample 0.001% eU; no analysis for U or P_2O_5: 935; Maplewood shale member of Clinton formation, a greenish platy shale with abundant phosphate nodules, channel sample from lower 12 in., radioactivity 0.004% eU, 0.001% U, and 3.5% P_2O_5, and channel samples 2-5 ft. above lower contact, 0.004% eU, 0.001% U and no P_2O_5: 935;

NEW YORK (contd.)

Monroe County (contd.)
Radioactive Rocks
Genesee River gorge at Rochester:
Grimsby sandstone, red sandstone and red sandy shale, grab sample, radioactivity 0.002% eU; no analysis for U or P_2O_5: 935;
Thorold sandstone, a white to gray sandstone, sample, radioactivity 0.002% eU, no analysis for U or P_2O_5: 935.
Thorium Occurrences
Rochester: monazite, trace: 11.

New York County
Autunite Occurrences
New York City
Manhattan Island: a vein of coarse pegmatite at 171 St. and Fort Washington Avenue contained in three pockets, monazite, xenotime, and tourmaline, and the a ssociated minerals included zircon and questionable occurrences of autunite and torbernite: 784; autunite, monazite, xenotime, tourmaline, and zircon in pegmatite vein at Fort Washington Avenue and 175 Street, Washington Heights: 1021; autunite (?) at Fort George: 693.
Microlite Occurrences
New York City
Manhattan Island: microlite as small octahedrons in oligoclase at 39th Street between 6th and 7th avenues: 693, 768; microlite in oligoclase on Broadway at 39th Street: 845.
Monazite Occurrences
New York City
Manhattan Island: monazite at two localities in Washington Heights: 693; on Harlem River Speedway at 185 Street, xenotime and monazite, embedded in oligoclase near a coarse granite, occur associated and in well defined crystals: 884; monazite and xenotime at unnamed location: 839;

NEW YORK (contd.)

New York County (contd.)
Monazite Occurrences
New York City
Manhattan Island:
autunite, monazite, xenotime, tourmaline, and zircon in pegmatite vein at Fort Washington Avenue and 175th Street, Washington Heights: 1021; monazite, xenotime, garnet, and zircon in pegmatite vein at Amsterdam Avenue and 155th Street: 1021; monazite, plentiful locally, found at 155th Street and Amsterdam Avenue and also with xenotime and zircon at 171st Street and Fort Washington Avenue: 768; a vein of coarse pegmatite at 171st Street and Fort Washington Avenue contained in three pockets, monazite, xenotime, and tourmaline, and the associated minerals included zircon and questionable occurrences of autunite and torbernite: 784; monazite at 171st Street and Fort Washington Avenue showed neither fluorescence nor phosphorescence under ultraviolet light, although samples of Th and Zr dioxides, of which this mineral contains some, did show phosphorescence: 652; single xenotime crystal found at 155th Street and 11th Avenue in 1872 in pegmatite vein cutting gneiss; Niven found some in same area in 1888 and also monazite and zircon: 775.
Orthite Occurrences
New York City
Manhattan Island: orthite in feldspar at Central Park and Broadway: 640; orthite in dark reddish brown to black crystals $2\frac{1}{2}$ - 3 in. long in white oligoclase granite at 56th Street and Broadway: 693, 768, 845.

NEW YORK (contd.)

New York County (contd.)
Thorium Occurrences
New York City
Manhattan Island: some locations on Broadway: microlite in oligoclase at 39th Street; orthite in crystals $2\frac{1}{2}$ - 3 in. long in white oligoclase at 56th Street; uraninite at 155th Street; xenotime (one small crystal) at 165th Street: 845; on Harlem River Speedway at 185th Street, xenotime and monazite, embedded in oligoclase near a coarse granite, occur associated and in well defined crystals: 884; monazite, xenotime, garnet, and zircon in pegmatite vein at Amsterdam Avenue and 155th Street: 1021; autunite, monazite, xenotime, tourmaline, and zircon in pegmatite vein at Fort Washington Avenue and 175th Street, Washington Heights: 1021; microlite as small octahedron in oligoclase at 39th Street between 6th and 7th Avenues: 693, 768; orthite in feldspar at Central Park and Broadway: 640; monazite at two localities in Washington Heights: 693; monazite and xenotime at unnamed location: 839; monazite, plentiful locally, found at 155th Street and Amsterdam Avenue and also with xenotime and zircon at 171st Street and Fort Washington Avenue, Washington Heights: 768; monazite at 171st Street and Fort Washington Avenue, Washington Heights, showed neither fluorescence nor phosphorescence under ultra-violet light, although samples of Th and Zr dioxides, of which this mineral contains some, did show phosphorescence: 652; a vein of coarse pegmatite at 171st Street and Fort Washington Avenue, Washington Heights, contained in three pockets, monazite, xenotime, and tourmaline, and the associated minerals included zircon and questionable occurrences of autunite and torbernite: 784;

NEW YORK (contd.)

New York County (contd.)
Thorium Occurrences
New York City
Manhattan Island: orthite in dark reddish brown to black crystals $2\frac{1}{2}$ - 3 in. long in white oligoclase granite at 56th Street and Broadway: 693, 768, 845; uraninite(?) at 175th Street at 11th Avenue, Washington Heights: 693; xenotime at 155th Street at Amsterdam Avenue: 693; single xenotime crystal found at 155th Street and 11th Avenue in 1872 in pegmatite vein cutting gneiss; Niven found some in same area in 1888 and also monazite and zircon: 775; specimen of xenotime found in 1888 came from a dump with blocks of mica schist and gneiss at 175th Street at 10th Avenue, so original source is doubtful: 884.

Torbernite Occurrences
New York City
Manhattan Island: a vein of coarse pegmatite at 171st Street and Fort Washington Avenue contained in three pockets, monazite, xenotime, and tourmaline, and the associated minerals included zircon and questionable occurrences of autunite and torbernite: 784.

Uraninite Occurrences
New York City
Manhattan Island: uraninite on Broadway at 155th Street: 845; uraninite (?) at 175th Street at 11th Avenue, Washington Heights: 693.

Uranite Occurrences
New York City
Manhattan Island: possible uranite occurrence on old Columbia College land at 5th Avenue and 49th Street

NEW YORK (contd.)

New York County (contd.)
Uranite Occurrences
New York City
Manhattan Island:
(now occupied by Rockefeller Center); mineral may be mica colored by copper content: 640:

Uranium Occurrences
New York City
Manhattan Island; some locations on Broadway: microlite in oligoclase at 39th Street; orthite in crystals $2\frac{1}{2}$ - 3 in. long in white oligoclase at 56th Street; uraninite at 155th Street; xenotime (one small crystal) at 165th Street: 845; autunite, monazite, xenotime, tourmaline, and zircon in pegmatite vein at Fort Washington Avenue and 175th Street, Washington Heights: 1021; autunite(?) at Fort George: 693; microlite as small octahedrons in oligoclase at 39th Street and 6th and 7th Avenue: 693, 768; possible uranite occurrence on old Columbia College land at 5th Avenue and 49th Street (now occupied by Rockefeller Center); mineral may be mica colored by copper content: 640; uraninite(?) at 175th Street at 11th Avenue, Washington Heights: 693; a vein of coarse pegmatite at 171 Street and Fort Washington Avenue, contained in three pockets, monazite, xenotime, and tourmaline, and the associated minerals included zircon and questionable occurrences of autunite and torbernite: 784.

Xenotime Occurrences
New York City
Manhattan Island: on Harlem River Speedway at 185th Street, xenotime and monazite embedded in oligoclase near a coarse granite, occur associated and in well defined crystals: 884; autunite, monazite, xenotime, tourmaline, and zircon in pegmatite vein at Fort Washington Avenue and 175th Street, Washington Heights: 1021;

NEW YORK (contd.)

New York County (contd.)
Xenotime Occurrences
New York City
Manhattan Island:
monazite and xenotime at unnamed location: 839; on Broadway at 165th Street, xenotime, one small crystal: 845; monazite, xenotime, garnet, and zircon in pegmatite vein at Amsterdam Avenue and 155th Street: 1021; a vein of coarse pegmatite at 171st Street and Fort Washington Avenue contained in three pockets, monazite, xenotime, and tourmaline, and associated minerals included zircon, and questionable occurrences of autunite and torbernite: 784; monazite, plentiful locally, found at 155th Street and Amsterdam Avenue and also with xenotime and zircon at 171st Street and Fort Washington Avenue: 768; xenotime at 155th Street at Amsterdam Avenue: 693; single xenotime crystal found at 155th Street and 11th Avenue in 1872 in pegmatite vein cutting gneiss; Niven found some in same area in 1888 and also monazite and zircon: 775; specimen of xenotime found in 1888 came from a dump with blocks of mica schist and gneiss at 175 Street at 10th Avenue, so original source is doubtful: 884.

(See also Bronx-Kings-New York-Queens-Richmond Counties: 846).

Niagara County
Radioactive Rocks
Niagara Gorge, 3 mi. N of Niagara Falls: radiometric examination in field of Clinton formation shales, sandstones, and limestones; no radioactivity found; no sample analyzed: 935.

NEW YORK (contd.)

Oneida County
Radioactive Rocks
Clinton Metallic Paint Company mine on Brimfield Street in Clinton: radiometric analyses in the laboratory of three grab samples of Westmoreland iron ore member of Clinton formation, an oolitic iron ore, gave following results: two samples, 0.001% eU and no analysis for U or P_2O_5; third sample, 0.002% eU, 0.001% U, and 0.2% P_2O_5: 935.
Adirondack Mountains
Forestport, Unnumbered road N of Hinckley Reservoir, 11.4 mi. S of bridge on New York Highway 28 near: radioactivity of glacial cover on Trenton limestone, estimated as 0.002-0.004% eU with average estimated as ±0.001% eU since there are local highs in glacial cover: 875.
Hawkinsville, New York Highway 12, S of Boonville at junction with unnumbered road to: radioactivity of glacial cover on Trenton limestone, estimated as 0.002-0.003% eU with average estimated as ± 0.001% eU; no outcrops present but locally high in crystalline glacial boulders: 875.

Orange County
Age Determinations
Deer Hill 3 mi. S of Cornwall: non-metamict zircon gave a probable geologic age in m.y. of 400 ± 100 and an activity of 1.4 ± 0.1 alpha/mg/min: 821.
Allanite Occurrences
General: allanite: 249; allanite as massive, pitch black mineral; one chemical analysis showed it contained Ce, La but made no mention of Th: 760.
Amity: allanite, yttrocerite: 779.
Edenville in Warwick township: allanite: 920; allanite; mineralogy studied by Michel-Levy: 810; allanite, yttrocerite: 779, 846.

NEW YORK (contd.)

Orange County (contd.)
Allanite Occurrences
Monroe: allanite: 846, 950; allanite or orthite: 810; allanite in a vein in feldspar and quartz; mineralogical characteristics; no Th listed in composition: 662.
Mount Adam in Warwick township: hornblende granite, intruded into limestone, contains abundant allanite and many pegmatite veins, which together have spoiled much of the stone for quarrying: 921; allanite in granite and coarse pegmatite of the quarries: 810; granite quarry on NW slope, allanite in granite and pegmatite: 710.
Mount Eve in Warwick township: hornblende granite intruded into limestone, contains abundant allanite and many pegmatite veins, which together have spoiled much of the stone for quarrying: 921; allanite in granite and coarse pegmatite of the quarries: 810.
Pine Island: allanite: 710; first reported occurrences of allanite in tabular crystals in a pegmatite dike in an abandoned limestone quarry: 1043.
Tuxedo Park quarry: allanite in granite: 637.
West Point: allanite: 846, 950; allanite with pyroxene and wernerite in gneiss: 1021; allanite in gneiss; chemical analysis makes no mention of thorium: 666.
West Point quadrangle, scattered areas shown on: allanite as a rare accessory mineral in Storm King granite: 667.

NEW YORK (contd.)

Orange County (contd.)
Radioactive Magnetite
Forest of Dean mine, now under reservoir on West Point Military Academy land 8 mi. NW of Peekskill: radioactivity of pieces of rock and ore along bank of reservoir indicating orebody was coarse-grained magnetite and country rock, coarse-grained granite, less than 0.03 mr/hr.: 843.
Sterling Furnace mines at Sterling Furnace: radioactivity of magnetite orebodies replacing gneiss of Precambrian age, less than 0.03 mr/hr.: 843.
Radioactive Rocks
Hudson Highlands
Bear Mountain
Area E of Bear Mountain Inn: radioactivity ranging from 0.005 to 0.200% eU reported in a 3-6 mi. area of pegmatites, some granitic rocks, and quartz-feldspar-biotite gneisses from five roadside localities; parts of granitic rocks probably had an average of 0.005% eU but no highly radioactive granite or pegmatites within granite were found: 842; radioactive minerals in the pegmatites were not identified; mineral analysis of quartz-feldspar pegmatitic gneiss showed abundant zircon, a lesser amount of opaque minerals, and an unidentified mineral or aggregate of minerals containing some U and Th and coating various grains of the pegmatite as a dull yellowish crust: 842; radiometric and chemical analyses of 22 samples of the pegmatite, gneiss, and biotite and quartzite material from this area showed ranges of 0.002-0.184% eU, 0.001-0.065% U, and 0.03-0.48% ThO_2 (latter occurring in only 5 of 22 samples with 4 in pegmatite and only one in gneiss): 842;

NEW YORK (contd.)

Orange County (contd.)
Radioactive Rocks
Hudson Highlands
Bear Mountain
Area E of Bear Mountain Inn: distribution and relative gamma radioactivity of area found by traverses: 842; on basis of the few data available, deposit is estimated to contain 5600 t. of rock per foot of depth averaging 0.045% Th and 0.006% U; latter figures might be raised to 0.160% Th and 0.020% U by selective mining of the rock since most of U and Th is concentrated in pegmatite and adjacent gneiss: 842.
Area E of Bear Mountain Inn and about 0.3 mi. to the S. of above: radioactive area of quartz-feldspar-biotite gneisses probably in the Storm King granite; radioactivity limited to a few massive layers; radiometric and chemical analyses of two biotite gneiss samples gave 0.009 and 0.013% eU, 0.003 and 0.004% U, and 0.005 and 0.024% ThO_2: 842.
Highland Falls: radioactive area probably present in front yard of a city residence, which was not explored or sampled; car traverse instruments recorded a radioactivity in excess of 0.010% eU in the rock: 842.
West Point Military Reservation: pegmatites in quartz-feldspar-biotite gneisses contain greatest concentration of radioactive material; radiometric and chemical analyses of four samples of biotite gneiss and pegmatite showed ranges of 0.002-0.57% eU, 0.001-0.005% U, and in one pegmatite, 0.20%

NEW YORK (contd.)

Orange County (contd.)
Radioactive Rocks
Hudson Highlands
West Point Military Reservation: ThO_2; presence of highly radioactive pegmatite makes detection of radioactivity in the gneiss difficult in the field but for an area 50 by 350 ft., the combined radioactivity is estimated to range from 0.005-0.020% eU: 842.
Hudson Valley
Newburgh, New York Highway 32, 2.7 mi. NW of junction with U.S. Highway 9W in: radioactivity of shaley slates in Hudson River Snake Hill formation, estimated as 0.002-0.003% eU: 875.
Pine Bush, New York Highway 52: radioactivity of glacial cover on Snake Hill shale, estimated as 0.003% eU: 875.
Pine Bush, New York Highway 52, 3.2 mi. SE of: radioactivity of red sandstone and shale of Snake Hill shale estimated as 0.002-0.004%: 875.
Washingtonville, New York Highway 94, 4-5 mi. SW of: radioactivity of dark slate in Hudson River formation, estimated as 0.001-0.003% eU: 875.
Thorium Occurrences
General: allanite: 249; allanite as massive, pitch black mineral; one chemical analysis showed it contained Ce, La but made no mention of Th: 760; yttrocerite in limestone: 663.
Amity: allanite, yttrocerite: 779; yttrocerite associated with talc and other minerals in white limestone: 663.
Edenville in Warwick township: allanite: 920; allanite; mineralogy studied by Michel-Levy: 810; allanite, yttrocerite: 779; allanite, yttrocerite: 846.

NEW YORK (contd.)

Orange County (contd.)
Thorium Occurrences
Hudson Highlands
Bear Mountain
Area E of Bear Mountain Inn: radioactivity ranging from 0.005 to 0.200% eU reported in a 3-6 mi. area of pegmatites, some granitic rocks, and quartz-feldspar-biotite gneisses from five roadside localities; parts of granitic rocks probably had an average of 0.005% eU but no highly radioactive granite or pegmatites within granite were found: 842; radioactive minerals in the pegmatites were not identified; mineral analysis of quartz-feldspar pegmatitic gneiss showed abundant zircon, a lesser amount of opaque minerals, and an unidentified mineral or aggregate of minerals containing some U and Th and coating various grains of the pegmatite as a dull yellowish crust: 842; radiometric and chemical analyses of 22 samples of the pegmatite, gneiss, and biotite and quartzite material from this area showed ranges of 0.002-0.184% eU, 0.001-0.065% U, and 0.03-0.48% ThO_2 (latter occurring in only 5 of 22 samples with 4 in pegmatite and only one in gneiss): 842; distribution and relative gamma radioactivity of area found by traverses: 842; on basis of the few data available, deposit is estimated to contain 5600 t. of rock per ft. of depth averaging 0.045% Th and 0.006% U; latter figures might be raised to 0.160% Th and

NEW YORK (contd.)

Orange County (contd.)
Thorium Occurrences
Hudson Highlands
Bear Mountain
Area E of Bear Mountain Inn: 0.020% U by selective mining of the rock since most of U and Th is concentrated in pegmatite and adjacent gneiss: 842.
Area E of Bear Mountain Inn and about 0.3 mi. to the S of the above: radioactive area of quartz-feldspar-biotite gneisses probably in the Storm King granite; radioactivity limited to a few massive layers; radiometric and chemical analyses of two biotite gneiss samples gave 0.009 and 0.013% eU, 0.003 and 0.004% U, and 0.005 and 0.024% ThO_2: 842.
West Point Military Reservation: pegmatites in quartz-feldspar-biotite gneisses contain greatest concentration of radioactive material; radiometric and chemical analyses of four samples of biotite gneiss and pegmatite showed ranges of 0.002-0.57% eU, 0.001-0.005% U, and, in one pegmatite, 0.20% ThO_2; presence of highly radioactive pegmatite makes detection of radioactivity in the gneiss difficult in field but for an area 50 by 350 ft. the combined radioactivity is estimated to range from 0.005-0.020% eU: 842.
Monroe: allanite: 846, 950; allanite in a vein in feldspar and quartz; mineralogical characteristics; no Th listed in composition: 662; allanite or orthite: 810.
Mount Adam in Warwick township: hornblende granite, intruded into limestone, contains abundant allanite and many pegmatite veins, which together have spoiled much of the stone for quarrying: 921; allanite in granite and coarse pegmatite of the quarries: 810; granite quarry on NW slope, allanite in granite and pegmatite: 710.

NEW YORK (contd.)

Orange County (contd.)
Thorium Occurrences
Mount Eve in Warwick township: hornblende granite, intruded into limestone, contains abundant allanite and many pegmatite veins, which together have spoiled much of the stone for quarrying: 921; allanite in granite and coarse pegmatite of the quarries: 810.
Pine Island: allanite: 710; first reported occurrence of allanite in tabular crystals in a pegmatite dike in an abandoned limestone quarry: 1043.
Tuxedo Park quarry: allanite in granite: 637.
West Point: allanite: 846, 950; allanite with pyroxene and wernerite in gneiss: 1021; allanite in gneiss; chemical analysis makes no mention of thorium: 666.
West Point quadrangle, scattered areas shown on: allanite as a rare accessory mineral in Storm King granite: 667.
Uranium Occurrences
Hudson Highlands: uranium rather uniformly disseminated through several biotite-rich zones in granite gneiss; individual zones, only 3 in. across, traceable for hundreds of ft. with no discernible change in strike; selected samples assayed chemically slightly over 0.1% U_3O_8: 1005.
Bear Mountain
Area E of Bear Mountain Inn: radioactivity ranging from 0.005 to 0.200% eU reported in a 3-6 mi. area of pegmatites, some granitic rocks, and quartz-feldspar-biotite gneisses from five roadside localities; parts of granitic rocks probably had an average of 0.005% eU but no highly radioactive granite

NEW YORK (contd.)

Orange County (contd.)
Uranium Occurrences
Hudson Highlands
Bear Mountain
Area E of Bear Mountain Inn: or pegmatites within granite were found: 842; radioactive minerals in the pegmatites were not identified; mineral analysis of quartz-feldspar pegmatitic gneiss showed abundant zircon, a lesser amount of opaque minerals, and an unidentified mineral or aggregate of minerals containing some U and Th and coating various grains of the pegmatite as a dull yellowish crust: 842; radiometric and chemical analyses of 22 samples of the pegmatite, gneiss, and biotite and quartzite material from this area showed ranges of 0.002-0.184% eU, 0.001-0.065% U, and 0.03-0.48% ThO_2 (latter occurring in only 5 of 22 samples with 4 in pegmatite and only one in gneiss): 842; distribution and relative gamma radioactivity of area found by traverses: 842; on basis of the few data available, deposit is estimated to contain 5600 t. of rock per ft. of depth averaging 0.045% Th and 0.006% U; latter figures might be raised to 0.160% Th and 0.020% U by selective mining of the rock since most of U and Th is concentrated in pegmatite and adjacent gneiss: 842.
Area E of Bear Mountain Inn and about 0.3 mi. to the S of the above: radioactive area of quartz-feldspar-biotite gneisses probably in the Storm King granite; radioactivity limited to a few massive layers; radiometric and chemical analyses of two biotite gneiss samples gave 0.009 and 0.013% eU, 0.003 and 0.004% U, and 0.005 and 0.024% ThO_2: 842.

NEW YORK (contd.)

Orange County (contd.)
Uranium Occurrences
Hudson Highlands
West Point Military Reservation: pegmatites in quartz-feldspar-biotite gneisses contain greatest concentration of radioactive material; radiometric and chemical analyses of four samples of biotite gneiss and pegmatite showed ranges of 0.002-0.57% eU, 0.001-0.005% U, and in one pegmatite, 0.20% ThO_2; presence of highly radioactive pegmatite makes detection of radioactivity in the gneiss difficult in the field but for an area 50 by 350 ft. the combined radioactivity is estimated to range from 0.005-0.020% eU: 842.
Yttrocerite Occurrences
General: yttrocerite in limestone: 663.
Amity: allanite, yttrocerite: 779; yttrocerite associated with talc and other minerals in white limestone: 663.
Edenville in Warwick township: allanite, yttrocerite: 779, 846.

Orthite Occurrences
See under individual county names and under Index III, Thorium Occurrences-New York: 640, 693, 768, 845, 846.

Pitchblende Occurrences
See under individual county names and under Index III, Pitchblende Occurrences-New York: 842, 1029, 1098.

Prospectors' Guides
See under individual county names and under Index III, Prospectors' Guides-New York: 1101, 1107.

NEW YORK (contd.)

Putnam County

Allanite Occurrences

Aqueduct Shaft No. 8, on abandoned dumps: allanite: 1056.

Boyd Corners Reservoir: exposure of typical Reservoir granite in which allanite is a rare accessory mineral: 667.

Taconic or Eastern State Parkway: allanite found at three occurrences along this parkway between Peekskill Hollow Road and the Putnam-Dutchess County line: 1027; allanite very common in a flesh-colored large pegmatite dike, 75 ft. long and 40 ft. high on W side of road just about 1 mi. S of the Putnam-Dutchess County line: 1033.

West Point quadrangle, areas shown on: allanite as a rare accessory mineral in Reservoir granite and Storm King granite: 667.

Autunite Occurrences

Tilly Foster mine: autunite as a yellowish coating on gneiss: 986; small autunite scales in syenite-gneiss: 987.

Iron Deposits, Thorium-bearing

Phillips pyrite mine: uraninite associated with magnetite, hornblende gneiss, and possibly a sulfide-bearing shear zone; deposit may be significant, though no analogous ones were known then; if uranium is coextensive with magnetite-bearing rock, actually a lean magnetite ore similar to that in gneiss of Adirondacks and Highlands of New York and New Jersey, there could be a large tonnage of uranium: 995; age determinations to be made on uraninite and compared with the 620 m.y. found for zircon on nearby Mine Mountain in hornblende granite to see if uranium is related to granite or to later mineralization in structures developed in the granite; topographic base map of Phillips mine and adjacent area on scale of 1:2400 to be used for recording dip-needle and scintillation-counter traverses and mapping geology of area: 996.

NEW YORK (contd.)

Putnam County (contd.)

Iron Deposits, Uranium-bearing

Phillips pyrite mine: uraninite associated with magnetite, hornblende gneiss, and possibly a sulfide-bearing shear zone; deposit may be significant, though no analogous ones were known then; if uranium is coextensive with magnetite-bearing rock, actually a lean magnetite ore similar to that in gneiss of Adirondacks and Highlands of New York and New Jersey, there could be a large tonnage of uranium: 995; age determinations to be made on uraninite and compared with the 620 m.y. found for zircon on nearby Mine Mountain in hornblende granite to see if uranium is related to granite or to later mineralization in structures developed in the granite; topographic base map of Phillips mine and adjacent area on scale of 1:2400 to be used for recording dip-needle and scintillation-counter traverses and mapping geology of area: 996; uranium: 841.

Monazite Occurrences

Hudson Highlands

Carmel, at a 100-ft. roadcut on New York Highway 301, 4.5 mi. E of U.S. Highway 9: radioactivity of gneiss and quartz veins, 0.006% eU, the highest radioactivity of rock in place; radiometric and chemical analyses of a sample of a quartz schistose gneiss and quartz sulfide rock, with very radioactive monazite in minor amounts, 0.24% eU, 0.095% U, and 1.04% ThO_2: 842.

NEW YORK (contd.)

Putnam County (contd.)
Radioactive Rocks
Hudson Highlands
Road traverse on New York Highways 301 and 52: average radioactivity of outcrops of gneissic rock and glacial debris; 0.002% eU: 842;
Carmel, at a 100-ft. roadcut on New York Highway 301, 4.5 mi. E of U.S. Highway 9: radioactivity of gneiss and quartz veins, 0.006% eU, the highest radioactivity of rock in place; radiometric and chemical analyses of a sample of a quartz schistose gneiss and quartz sulfide rock, with very radioactive monazite in minor amounts, 0.24% eU, 0.095% U, and 1.04% ThO_2: 842.
Carmel, 3.5 mi. W of, in 50 ft. outcrop along New York Highway 301: radioactivity of pegmatite in gneiss, 0.004% eU; radioactivity of biotite segregations in pegmatite, 0.01% eU: 842.
Radioactive Magnetite
Continental Village mines along Sprout Brook 2 mi. N of Peekskill: radioactivity of magnetite in hornblende gneiss, less than 0.03 mr/hr.: 843.
Thorium Occurrences
Aqueduct Shaft No. 8, on abandoned dumps: allanite: 1056.
Boyd Corners Reservoir: exposure of typical Reservoir granite in which allanite is a rare accessory mineral: 667.
Garrison: uraninite and its alteration products in scattered high-grade pockets of hornblende and biotite in gneiss: 883.
Hudson Highlands
Carmel, at a 100-ft. roadcut on New York Highway 301, 4.5 mi. E of U.S. Highway 9: radioactivity of gneiss and quartz veins, 0.006% eU, the highest radioactivity of rock in place; radiometric and chemical analyses of a sample of a quartz schistose gneiss and quartz

NEW YORK (contd.)

Putnam County (contd.)
Thorium Occurrences
Hudson Highlands
Carmel, at a 100-ft. roadcut on New York Highway 301, 4.5 mi. E of U.S. Highway 9: sulfide rock, with very radioactive monazite in minor amounts, 0.24% eU, 0.095% U, and 1.04% ThO_2: 842.
Phillips pyrite mine: uraninite accociated with magnetite, hornblende gneiss, and possibly a sulfide-bearing shear zone; deposit may be significant, though no analogous ones were known then; if uranium is coextensive with magnetite-bearing rock, actually a lean magnetite ore similar to that in gneiss of Adirondacks and Highlands of New York and New Jersey, there could be a large tonnage of uranium: 995; age determinations to be made on uraninite and compared with the 620 m.y. found for zircon on nearby Mine Mountain in hornblende granite to see if uranium is related to granite or to later mineralization in structures developed in the granite; topographic base map of Phillips mine and adjacent area on scale of 1:2400 to be used for recording dip-needle and scintillation-counter traverses and mapping geology of area: 996.
Taconic or Eastern State Parkway: allanite found at three occurrences along this parkway between Peekskill Hollow Road and the Putnam-Dutchess County line: 1027; allanite very common in a flesh-colored large pegmatite dike, 75 ft. long and 40 ft. high on W side of road just about 1 mi. S of the Putnam-Dutchess County line: 1033.

NEW YORK (contd.)

Putnam County (contd.)

Thorium Occurrences

West Point quadrangle, areas shown on: allanite as a rare accessory mineral in Reservoir granite and Storm King granite: 667.

Iron Deposits, Thorium-bearing

Phillips pyrite mine: uraninite associated with magnetite, hornblende gneiss, and possibly a sulfide-bearing shear zone; deposit may be significant, though no analogous ones were known then; if uranium is coextensive with magnetite-bearing rock, actually a lean magnetite ore similar to that in gneiss of Adirondacks and Highlands of New York and New Jersey, there could be a large tonnage of uranium: 995; age determinations to be made on uraninite and compared with the 620 m.y. found for zircon on nearby Mine Mountain in hornblende granite to see if uranium is related to granite or to later mineralization in structures developed in the granite; topographic base map of Phillips mine and adjacent area on scale of 1:2400 to be used for recording dip-needle and scintillation-counter traverses and mapping geology of area: 996.

Uraninite Occurrences

Garrison: uraninite and its alteration products in scattered high-grade pockets of hornblende and biotite in gneiss: 883.

Phillips pyrite mine: uraninite associated with magnetite, hornblende gneiss, and possibly a sulfide-bearing shear zone; deposit may be significant, though no analogous ones were known then; if uranium is coextensive with magnetite-bearing rock, actually a lean magnetite ore similar to that in gneiss of Adirondacks and Highlands of New York and New Jersey, there could be a large tonnage of uranium: 995;

NEW YORK (contd.)

Putnam County (contd.)

Uraninite Occurrences

Phillips pyrite mine: age determinations to be made on uraninite and compared with the 620 m.y. found for zircon on nearby Mine Mountain in hornblende granite to see if uranium is related to granite or to later mineralization in structures developed in the granite; topographic base map of Phillips mine and adjacent area on scale of 1:2400 to be used for recording dip-needle and area scintillation-counter traverses and mapping geology of area: 996.

Uranium Occurrences

Garrison: uraninite and its alteration products in scattered high-grade pockets of hornblende and biotite in gneiss: 883.

Hudson Highlands

Carmel, at a 100-ft. roadcut on New York Highway 301, 4.5 mi. E of U.S. Highway 9: radioactivity of gneiss and quartz veins, 0.006% eU, the highest radioactivity of rock in place; radiometric and chemical analyses of a sample of a quartz schistose gneiss and quartz sulfide rock, with very radioactive monazite in minor amounts, 0.24% eU, 0.095% U and 1.04% ThO_2: 842.

Carmel, 3.5 mi. W of, in 50 ft. outcrop along New York Highway 301: radioactivity of pegmatite in gneiss, 0.004% eU; radioactivity of biotite segregations in pegmatite, 0.01% eU: 842.

Phillips pyrite mine: uraninite associated with magnetite hornblende gneiss, and possibly a sulfide-bearing shear zone; deposit may be significant, though no analogous ones were

NEW YORK (contd.)

Putnam County (contd.)
Uranium Occurrences
Phillips pyrite mine:
known then; if uranium is coextensive with magnetite-bearing rock, actually a lean magnetite ore similar to that in gneiss of Adirondacks and Highlands of New York and New Jersey, there could be a large tonnage of uranium: 995; age determinations to be made on uraninite and compared with the 620 m.y. found for zircon on nearby Mine Mountain in hornblende granite to see if uranium is related to granite or to later mineralization in structures developed in the granite; topographic base map of Phillips mine and adjacent area on scale of 1:2400 to be used for recording dip-needle and scintillation-counter traverses and mapping geology of area: 996; uranium: 841.
Tilly Foster mine: autunite as a yellowish coating on gneiss: 986; small autunite scales in syenite-gneiss: 987.
Iron Deposits, Uranium-bearing
Phillips pyrite mine: uraninite associated with magnetite, hornblende gneiss, and possibly a sulfide-bearing shear zone; deposit may be significant, though no analogous ones were known then; if uranium is coextensive with magnetite-bearing rock, actually a lean magnetite ore similar to that in gneiss of Adirondacks and Highlands of New York and New Jersey, there could be a large tonnage of uranium: 995; age determinations to be made on uraninite and compared with the 620 m.y. found for zircon on nearby Mine Mountain in hornblende granite to see if uranium is related to granite or to later mineralization in structures developed in the granite; topographic base map of Phillips mine and adjacent area

NEW YORK (contd.)

Putnam County (contd.)
Uranium Occurrences
Iron Deposits, Uraium-bearing
Phillips pyrite mine:
on scale of 1:2400 to be used for recording dip-needle and scintillation-counter traverses and mapping geology of area: 996; uranium: 841.

Queens County
See Bronx - Kings - New York - Queens-Richmond Counties: 846.

Radioactive Gas
See under individual county names and under Index III, Radioactive Gas-New York: 869, 903.

Radioactive Magnetite
See under individual county names and under Index III, Radioactive Magnetite-New York: 785, 843.

Radioactive Minerals
See under individual county names and under Index III, Radioactive Minerals-New York: 798.

Radioactive Rocks
See under individual county names and under Index III, Radioactive Rocks-New York: 657, 745, 746, 786, 842, 843, 875, 935, 1103, 1107.

Radioactive Soil
See under individual county names and under Index III, Radioactive Soil-New York: 868.

Radioactive Spring Deposits
See under individual county names and under Index III, Radioactive Spring Deposits-New York: 657, 869.

NEW YORK (contd.)

Radioactive Springs
See under individual county names and under Index III, Radioactive Springs-New York: 625, 656, 657, 730, 869, 903.

Radioactive Waters
See under individual county names and under Index III, Radioactive Waters-New York: 722.

Rare Earths Occurrences
See under individual county names and under Index III, Rare Earths Occurrences-New York: 995.

Rensselaer County
Radioactive Rocks
Hudson Valley
Berlin, New York Highway 154, 1.8 to 2.1 mi. W of: radioactivity of slates and phyllites in Berkshire schist estimated as 0.003-0.004% eU: 875.
East Nassau, unnumbered road 0.5 mi. E of: radioactivity of glacial (?) cover on Rensselaer grit, estimated average radioactivity, 0.003% eU; no outcrop, so road metal may have caused activity: 875.
Grafton, U.S. Highway 2, 4.0 mi. W of: radioactivity of red quartzite and shale in Rensselaer grit, estimated as 0.002-0.003% eU: 875.
Poestenkill, New York Highway 154, 3.8 mi. E of: radioactivity of glacial (?) cover and large boulders in Rensselaer grit, estimated as 0.001-0.003% eU: 875.
Poestenkill, New York Highway 154, 4.9 mi. E of: radioactivity of glacial cover on Rensselaer grit, estimated as 0.003-0.004% eU: 875.
Poestenkill, New York Highway 154, 8.2 mi. E of: radioactivity of glacial (?) cover and large boulders in Rensselaer grit, estimated as 0.003-0.004% eU: 875.

NEW YORK (contd.)

Richmond County
Radioactive Rocks
New York City
Staten Island: Palisade diabase, 8 ft. below surface in quarry, activity 0.91 x 10^{-5}cc. He/g., 0.24 x 10^{-12}g. Ra/g., 2.14 x 10^{-6}g. Th/g., and age ratio 62 m. y.: 786.
Staten Island from old quarry at Forest Avenue:
1. Palisade diabase, radioactivity 0.24 ± 0.01 x 10^{-12}g.Ra/g.rock: 745;
2. average U and Th content found from average activity of 5 samples, 4 from New Jersey and 1 from New York, 0.54 ± 0.05 x 10^{-6}g. U/g. rock, 2.2 ± 0.3 x 10^{-6}g. Th/g. rock, and Th/U ratio 4.0: 745.
Thorium Occurrences
New York City
Staten Island: Palisade diabase, 8 ft. below surface in quarry, activity 0.91 x 10^{-5}cc. He/g., 0.24 x 10^{-12}g. Ra/g., 2.14 x 10^{-6}g. Th/g., and age ratio 62 m. y.: 786.
Staten Island from old quarry at Forest Avenue:
1. Palisade diabase, radioactivity 0.24 ± 0.01 x 10^{-12}g.Ra/g.rock: 745;
2. average U and Th content found from average activity of 5 samples, 4 from New Jersey and 1 from New York, 0.54 ± 0.05 x 10^{-6}g. U/g. rock, 2.2 ± 0.3 x 10^{-6}g. Th/g. rock, and Th/U ratio 4.0: 745.
Uranium Occurrences
New York City
Staten Island from old quarry at Forest Avenue:
1. Palisade diabase, radioactivity 0.24 ± 0.01 x 10^{-12}g. Ra/g.rock: 745;

NEW YORK (contd.)

Richmond County (contd.)
Uranium Occurrences
New York City
Staten Island from old quarry at Forest Avenue:
2. average U and Th content found from average activity of 5 samples, 4 from New Jersey and 1 from New York, 0.54 ± 0.05 x 10^{-6}g.U/g.rock, 2.2 ± 0.3 x 10^{-6}g.Th/g.rock, and Th/U ratio 4.0: 745.

(See also Bronx-Kings-New York-Queens-Richmond Counties: 846)

Rockland County
Radioactive Rocks
Palisades sill: helium and radioactivity data, 0.99 x 10^{-5}cc. He/g., 0.34 alphas/mg/hr: 798.

Schroeckingerite Occurrences
See under individual county names and under Index III, Schroeckingerite Occurrences-New York: 634, 972.

Slate, Uranium-bearing
See under individual county names and under Index III, Slate, Uranium-bearing-New York: 875.

St. Lawrence County
Allanite Occurrences
Benson mines, 2 mi. E of Star Lake along New York Highway 3, operated by Jones and Laughlin Steel Corp.: uranium-bearing magnetite deposit; a low grade replacement body in microcline granite gneiss; most radioactive parts of orebody were "disseminated garnet zone" and "blotchy garnet zone"; one sample of magnetite ore with allanite contained 0.017% eU but most of the rock and ore contained from 0.002 to 0.006% eU and an average of 0.005% eU: 843.

NEW YORK (contd.)

St. Lawrence County (contd.)
Allanite Occurrences
Gouverneur: Reservoir granite sill very similar to ordinary green syenite of Adirondack area at SW end where it plunges under limestone since it contains there, besides allanite, the peculiar green pyroxene and bronzite that characterize the syenite: 713.
Hammond quadrangle
Birch Creek, W side of: allanite in green granite sill in hornblende gneiss at SW end of Hyde granite mass: 683.
Chippewa Creek: allanite and tourmaline in Alexandria type granite mass along the creek: 683.
Magnetite, Uranium-bearing
Benson mines, 2 mi. E of Star Lake along New York Highway 3, operated by Jones and Laughlin Steel Corp.: uranium-bearing magnetite deposit; a low grade replacement body in microcline granite gneiss; most radioactive parts of orebody were "disseminated garnet zone" and "blotchy garnet zone"; one sample of magnetite ore with allanite contained 0.017% eU but most of the rock and ore contained from 0.002 to 0.006% eU and an average of 0.005% eU: 843.
Radioactive Magnetite
Benson: age determination tests were made on two specimens of magnetite and gave the following results: No. 1067 gave 0.81 activity by direct alpha count, 17.7 He, and age 647 m.y.; No. 1027 gave 0.337 activity by direct alpha count, 18.4 He, and age 1620 m.y.: 785.

NEW YORK (contd.)

St. Lawrence County (contd.)

Radioactive Magnetite

Clifton mines 4 mi. SE of Degrasse: radioactivity of massive magnetite as replacement of skarn in hornblende schist and gneiss, with small amount of uraninite in one outcrop of massive magnetite and large boulder of skarn and in pegmatite and a maximum activity of 0.2 mr/hr. on face of uraninite-bearing magnetite, gave less than 0.03 mr/hr. for one sample and negative results for two others: 843.

Fullerville Iron works, 5 mi. N of Balmat: radioactivity of what is probably a contact metamorphic deposit of magnetite and hematite, less than 0.03 mr/hr.: 843.

Green prospect 2 mi. S of Fine: radioactivity of contact metamorphic deposit at contact of granite gneiss with limestone, the mineralized zone containing magnetite, etc., less than 0.03 mr/hr.: 843.

Jayville: age determination tests were made on two specimens of magnetite and gave the following results: No. 1068 gave 0.082 activity by direct alpha count, 1.26 He, and age 455 m.y.; No. 1024 gave 0.168 activity by direct alpha count, 4.12 He, and age 726 m.y.: 785.

Jayville mines 7 mi. SW of Fine: radioactivity of magnetite orebody between hanging wall of pink granite gneiss and footwall of garnet-pyroxene skarn, less than 0.03 mr/hr.: 843.

Radioactive Rocks

Adirondack Mountains

Benson mines, New York Highway 3 at: radioactivity of glacial cover on Grenville metasediments, 0.003-0.004% eU: 875.

Benson mines, New York Highway 3, 0.9 mi. E of: radioactivity of granite, estimated as 0.004-0.005% eU: 875.

NEW YORK (contd.)

St. Lawrence County (contd.)

Radioactive Rocks

Adirondack Mountains

Benson mines, New York Highway 3, 1.4 mi. E of: radioactivity of red gneiss granite in granite, estimated as 0.006-0.009% eU: 875.

Benson mines, New York Highway 3, 1.8 - 2.1 mi. E of: radioactivity of glacial cover on granite and of small outcrops of granite, estimated as 0.006-0.009% eU: 875.

Benson mines, New York Highway 3, 2.8 mi. E of: radioactivity of gneiss in quartz syenite gneiss, estimated as 0.001-0.004% eU with average estimated as 0.004% eU: 875.

Brasie Corners, New York Highway 185, 1.3 mi. SW of: radioactivity of gneiss in area of biotite gneisses, white quartzite, interbedded limestone and quartzite, and local lenses of granite and pegmatite, estimated as 0.002-0.003% eU: 875.

Brasie Corners, New York Highway 185, 2.2 - 2.4 mi. SE of: radioactivity of gneiss in thin banded rock with limestone laminae, quartz and pyrite granulite, estimated as 0.004% eU with average estimated as 0.002-0.003% eU: 875.

Colton, New York Highway 56, 3.8 mi. S of bridge in: radioactivity of glacial cover on mixed rocks, probably gneisses, estimated as 0.002-0.004% eU; no outcrops, but radioactivity extends for about 0.2 mi.: 875.

NEW YORK (contd.)

St. Lawrence County (contd.)
Radioactive Rocks
Adirondack Mountains

Cranberry Lake, New York Highway 3, 0.7 mi. E of railroad crossing in: radioactivity of unidentified rock in Grenville metasediments and migmatites, estimated as 0.002-0.003% eU: 875.

Cranberry Lake, New York Highway 3, 1.4 mi. E of railroad crossing in: radioactivity of gneiss in Grenville metasediments and migmatites, estimated as 0.004-0.005% eU: 875.

Cranberry Lake, New York Highway 3, 2.0 mi. E of railroad crossing in: radioactivity of long outcrop of granite gneiss in granite, estimated as 0.002-0.005% eU: 875.

Cranberry Lake, New York Highway 3, 3.0 - 3.1 mi. E of railroad crossing in: radioactivity of glacial cover on granite, estimated as 0.004-0.005% eU with average estimated as + - 0.001% eU: 875.

Cranberry Lake, New York Highway 3, 1.1 - 1.4 mi. W of and at railroad crossing in: radioactivity of glacial cover on Grenville metasediments and migmatites, average estimated as 0.004% eU: 875.

Cranberry Lake, New York Highway 3, 1.9 mi. W of railroad crossing in: radioactivity of glacial cover on granite, average estimated as 0.006% eU: 875.

Cranberry Lake, New York Highway 3, 4.2 mi. W of railroad crossing in: radioactivity of granite, estimated as 0.003-0.004% eU: 875.

Cranberry Lake, New York Highway 3, 5.2-5.5 mi. W of railroad crossing in: radioactivity of glacial cover on Grenville metasediments and migmatites, estimated as 0.003-0.004% eU with average estimated as + - 0.001% eU: 875.

NEW YORK (contd.)

St. Lawrence County (contd.)
Radioactive Rocks
Adirondack Mountains

Degrasse, New York Highway 3, 1.0 mi. W of junction with road N to: radioactivity of long outcrop of gneiss in pyroxene gneiss or pink granite, estimated as 0.003-0.005% eU: 875.

Degrasse, Unnumbered road to, 0.9 mi. N of junction with New York Highway 3, E of Fine: radioactivity of red and green gneiss in garnet mica gneiss and schist injected by granite, estimated as 0.002-0.003% eU: 875.

Degrasse, Unnumbered road to, 1.5 mi. N of junction with New York Highway 3: radioactivity of granite in garnet mica gneiss and schist, average estimated as 0.004% eU: 875.

Degrasse, Unnumbered road to, 1.8 mi. N of junction with New York Highway 3: radioactivity of granite and amphibolite in rusty gneiss, quartz-pyrite, and some limestone beds, estimated as 0.002-0.003 % eU: 875.

Degrasse, Unnumbered road to, 2.0 mi. N of junction with New York Highway 3: radioactivity of granite and amphibolite in granite gneiss and grano-syenite gneiss, estimated as 0.002-0.003% eU; adjacent glacial materials showed up to 0.004% eU: 875.

NEW YORK (contd.)

St. Lawrence (contd.)
Radioactive Rocks
Adirondack Mountains

Degrasse, Unnumbered dirt road 4.1 mi. SE of bridge over Grass River SE of: radioactivity of glacial cover on Grenville metasediments and migmatite, estimated as 0.003-0.004% eU: 875.

Degrasse, Unnumbered dirt road 4.2 mi. SE of: radioactivity of glacial cover on granite, average estimated as 0.003% eU: 875.

Degrasse, Unnumbered dirt road 5.2 mi. SE of bridge over Grass River SE of: radioactivity of outcrop in road bed of granite in granite with amphibolite, estimated as 0.002-0.003% eU; glacial cover averages 0.002% eU: 875.

Degrasse, Unnumbered road 0.5 mi. S of: radioactivity of glacial cover on granite gneiss and grano-syenite gneiss, estimated as 0.002-0.004% eU: 875.

Degrasse, Unnumbered road 2.0 mi. S of: radioactivity of long outcrop of crystalline rock in granite gneiss and grano-syenite gneiss, estimated as 0.002-0.004% eU: 875.

Degrasse, Unnumbered road 2.4 mi. S of: radioactivity of granite in granite gneiss and grano-syenite gneiss, average estimated as 0.004% eU: 875.

Degrasse, Unnumbered road 4.0 mi. S of: radioactivity of glacial cover on granite gneiss and grano-syenite gneiss, estimated as 0.003-0.004% eU: 875.

DePeyster, Unnumbered road, 4.5 mi. S of: radioactivity of schist in various schists, usually mica or pyroxene, estimates as 0.002-0.004% eU: 875.

DePeyster, Unnumbered road, 6.0 mi. S of: radioactivity of gneissoid granite in amphibolite injected by porphyritic granite, estimated as 0.003-0.004% eU: 875.

NEW YORK (contd.)

St. Lawrence County (contd.)
Radioactive Rocks
Adirondack Mountains

DePeyster, Unnumbered road, 6.8 mi. SW of: radioactivity of limestone in crystalline limestone with pegmatites, quartz stringers, and silicates, estimated as 0.001-0.003% eU, and also as 0.001-0.003% eU in limestone in quartzite with thin stringers of limestone at a point 8.5 mi. SW of DePeyster: 875.

Edwards, New York Highway 58, 0.8 mi. S of junction with New York Highway 87 in: radioactivity of red granite in gneissic syenite, estimated as 0.002-0.003% eU: 875.

Edwards, Unnumbered road 6.0 mi. NW of junction with New York Highway 87 at: radioactivity of gneiss in porphyritic, gneissic, biotite granite mixed with amphibolites, estimated as 0.001-0.003% eU: 875.

Edwards, Unnumbered road 2.4 mi. S of junction with New York Highway 58, 5 mi. S of: radioactivity of glacial cover, average estimated as 0.003% eU: 875.

Edwards, Unnumbered road to East Pitcairn 1-1.1 mi. S of junction with New York Highway 58, 5 mi. S of: radioactivity of glacial cover on gneissic syenite, estimated as 0.003-0.004% eU with average estimated as +- 0.001% eU: 875.

Fine, New York Highway 3, 0.5 mi. W of junction with New York Highway 58, E of: radioactivity of red granite in pyroxene gneiss, average estimated as 0.004% eU: 875.

NEW YORK (contd.)

St. Lawrence County (contd.)
Radioactive Rocks
Adirondack Mountains
Fine, New York Highway 3, 2.0 mi. W of junction with New York Highway 58, E of: radioactivity of red granite in and glacial cover on pyroxene gneiss (?), estimated as 0.003-0.004% eU, with average also estimated as 0.003-0.004% eU: 875.
Fine, New York Highway 3, 2.2 mi. W of junction with New York Highway 58, E of: radioactivity of red granite in pyroxene gneiss, estimated average as 0.003% eU: 875.
Fine, New York Highway 3, 2.7 mi. W of junction with New York Highway 58, E of: radioactivity of glacial cobble bank on hornblende syenite granite, average estimated as 0.003% eU: 875.
Fine, New York Highway 3, 3.5 mi. W of junction with New York Highway 58, E of: radioactivity of granite in hornblende syenite granite, estimated as 0.002-0.003% eU: 875.
Fine, New York Highway 3, 4.6 mi. W of junction with New York Highway 58, E of: radioactivity of 200 ft. of outcrop of granite and amphibolite in hornblende syenite granite, estimated as 0.002-0.005% eU: 875.
Fine, New York Highway 58, 1.6 mi. NW of junction with New York Highway 3, W of: radioactivity of red and gray gneiss in rusty gneiss, usually quartzose and pyritic, estimated as 0.002-0.003% eU: 875.
Fine, New York Highway 58, 2.8-2.9 mi. NW of junction with New York Highway 3, W of: radioactivity of long outcrop of red granite in rusty gneiss, usually quartzose and pyritic, average estimated as 0.004% eU: 875.

NEW YORK (contd.)

St. Lawrence County (contd.)
Radioactive Rocks
Adirondack Mountains
Fine, New York Highway 58, 4.1 mi. NW of junction with New York Highway 3, W of: radioactivity of gneiss and red granite in granite gneiss and grano-syenite gneiss, estimated as 0.002-0.003% eU: 875.
Fine, Junction of New York Highways 3 and 58 W of: radioactivity of granite and gneiss in pyroxene gneiss, granitized in part, estimated as 0.004-0.008% eU: 875.
Fine, Unnumbered road, 0.1 mi. S of junction with New York Highway 3, near: radioactivity of glacial cover on pyroxene granitized gneiss, average estimated as 0.003% eU: 875.
Fine, Unnumbered road 0.7 mi. S of junction with New York Highway 3 near: radioactivity of long low outcrop of granite in pink granite, extending 0.3 mi., estimated as 0.006-0.007% eU: 875.
Fine, Unnumbered road 1.1 mi. S of junction with New York Highway 3 and 0.2 mi. W of junction with New York Highway 58, near: radioactivity of granite gneiss in pyroxene granite gneiss, average estimated as 0.003% eU: 875.
Fowler, Unnumbered dirt road 2.8-3.0 mi. N of intersection with New York Highway 58 near: radioactivity of crystalline rock in amphibolites cut and soaked by porphyritic granite, estimated as 0.002-0.003% eU: 875.
Gouverneur, Unnumbered road 1.4 mi. N of Oswegatchie River bridge N of: radioactivity of glacial cover on amphibolites injected by porphyritic

NEW YORK (contd.)

St. Lawrence County (contd.)
Radioactive Rocks
Adirondack Mountains

Gouverneur, Unnumbered road 1.4 mi. N of Oswegatchie River bridge N of: granites, estimated as 0.001-0.004% eU with average estimated as 0.001% eU: 875.

Gouverneur, Unnumbered road, 3.1 mi. N of Oswegatchie River bridge N of: radioactivity of massive pure crystalline limestone, estimated as 0.003% eU, and also as 0.002-0.004% eU at a point 3.8 mi. N of bridge: 875.

Gouverneur, Unnumbered road 4.8 mi. N of Oswegatchie River bridge N of: radioactivity of biotite granite gneiss and amphibolite in amphibolite injected by porphyritic granite, estimated as 0.002-0.008% eU: 875.

Hannawa Falls, New York Highway 56, 3.6 mi. S of bridge in: radioactivity of gneiss, average estimated as 0.004% eU: 875.

Hermon, Unnumbered road 6.3 mi. S of: radioactivity of red and gray gneiss in garnet-mica gneiss and banded sericite injected by granite, estimated as 0.001-0.003% eU: 875.

Hermon, Unnumbered road from Pyrites, 5.1-5.2 mi. NE of: radioactivity of glacial cover on gabbro and derived amphibolite, estimated as 0.002-0.003% eU with average estimated as 0.001% eU: 875.

Hopkintown and Potsdam, New York Highway 11B between: radioactivity of glacial cover in heavy ground moraine area, of which bedrock probably is Potsdam sandstone, estimated as 0.002-0.003% eU, with average estimated as 0.001% eU: 875.

Junction of unnumbered road with New York Highway 3, 0.2 mi. W of junction with New York Highway 58: radioactivity of red-gray granite gneiss in pyroxene granitized gneiss, average estimated as 0.003% eU: 875.

NEW YORK (contd.)

St. Lawrence County (contd.)
Radioactive Rocks
Adirondack Mountains

Newton Falls: radioactivity of glacial cover on Grenville metasediments and migmatite, estimated as 0.003-0.004% eU, with average estimated as 0.003% eU: 875.

Newton Falls, Unnumbered road 0.9 mi. W of: radioactivity of low outcrop of gneiss in Grenville metasediments and migmatite, estimated as 0.003-0.004% eU; glacial cover contained up to 0.004% eU: 875.

Newton Falls, Unnumbered road 6.2 mi. W of: radioactivity of granite, average estimated as 0.003% eU: 875.

Newton Falls, Unnumbered road to Benson mines 2.4 mi. S of: radioactivity of gneiss in Grenville metasediments and migmatite, average estimated as 0.004% eU: 875.

Oswegatchie, New York Highway 3, 0.1-0.3 and 0.3 mi. S of railroad crossing in: radioactivity of gneiss in hornblende granite gneiss, estimated as 0.002-0.003% eU: 875.

Oswegatchie, New York Highway 3, 1.2 mi. N of railroad crossing in: radioactivity of granite in hornblende granite gneiss, estimated as 0.002-0.005% eU: 875.

Oswegatchie, New York Highway 3, 3.6 and 4.9 mi. N of railroad crossing in: radioactivity of glacial cover on and gneiss in pyroxene gneiss, granitized in part with amphibolite, quartzite, and calcareous inclusions, estimated as 0.002-0.004% eU for each: 875.

NEW YORK (contd.)

St. Lawrence County (contd.)
Radioactive Rocks
Adirondack Mountains

Oswegatchie, Unnumbered road, at points 0.1 and 1.7 mi. W of junction with New York Highway 3, 2.4 mi. N of railroad crossing in: radioactivity of glacial cover on hornblende granite gneiss, at 0.1 mi. point, estimated as 0.003-0.004% eU with average estimated as 0.001% eU, and at 1.7 mi. point, estimated as 0.001-0.005% eU with average estimated as + - 0.001% eU: 875.

Pierrepont, Unnumbered road, 0.9 mi. SE of: radioactivity of gray gneiss in gabbro diorite, mostly amphibolite, injected by granite, estimated as 0.002-0.003% eU: 875.

Pierrepont, Unnumbered road, 1.9 mi. SW of: radioactivity of gray gneiss in garnet gneiss injected by amphibolite and granite, estimated as 0.002-0.003% eU: 875.

Pierrepont, Unnumbered road, 4.2 mi. SW of: radioactivity of gray gneiss in garnet-mica gneiss and banded schists injected by granite, estimated as 0.002-0.003% eU: 875.

Pope Mills, New York Highway 58, 4.2 mi. S of: radioactivity of pegmatite veinlets in quartzitic limestone in an area of biotite gneisses, white quartzite, interbedded limestone and quartzite, and local lenses of granite and pegmatite, average estimated as 0.003% eU; pegmatite veinlets contain up to 0.015% eU, measured with beta-gamma tube; glacial cover averages 0.002% eU with a local high of 0.003% eU: 875.

Rossie, New York Highway 185, 0.2 mi. NE of: radioactivity of gneiss in diorite and quartz diorite with local intrusive sheets of granite and aplite, average estimated as 0.003% eU: 875.

NEW YORK (contd.)

St. Lawrence County (contd.)
Radioactive Rocks
Adirondack Mountains

Rossie, Unnumbered road 0.2 mi. S of Indian River bridge near: radioactivity of granite in Hermon-type porphyritic granite, estimated as 0.003-0.004% eU: 875.

Russell, New York Highway 87, 0.6 mi. SW of Plum Creek bridge in: radioactivity of red and green gneiss with calcite banding in rusty gneiss, usually quartzose with pyrite and limestone bands, estimated as 0.002-0.004% eU: 875.

Russell, New York Highway 87, 0.7 mi. SW of Plum Creek bridge in: radioactivity of gray gneiss in rusty gneiss, usually quartzose with pyrite and limestone bands, estimated as 0.002-0.003% eU: 875.

Russell, New York Highway 87, 2.9 mi. SW of Plum Creek bridge in: radioactivity of long outcrop of red gneiss and carbonate rock in granite gneiss, grano-syenite gneiss, and rusty gneiss with occasional limestone bands, average estimated as 0.003% eU: 875.

Russell, New York Highway 87, 3.9 mi. SW of Plum Creek bridge in: radioactivity of pink granite gneiss in rusty gneiss, usually quartzose and pyritic, and syenite gneiss (?), estimated as 0.001-0.003 % eU: 875.

Russell, New York Highway 87, 4.9 mi. SW of Plum Creek bridge in: radioactivity of granite in syenite, usually gneissic, estimated as 0.001-0.003% eU: 875.

NEW YORK (contd.)

St. Lawrence County (contd.)
Radioactive Rocks
Adirondack Mountains

Russell, New York Highway 87, 5.5 mi. SW of Plum Creek bridge in: radioactivity of granite (?) in syenite, usually gneissic, estimated as 0.002-0.003% eU: 875.

Russell, Unnumbered road 0.9 mi. NE of Plum Creek bridge in: radioactivity of gray gneiss in rusty gneiss, usually quartzose, with pyrite and limestone bands, estimated as 0.002-0.004% eU: 875.

Russell, Unnumbered road 1.4 mi. NE of Plum Creek bridge in: radioactivity of greenish gray gneiss in rusty gneiss, usually quartzose, with pyrite and limestone bands, estimated as 0.002-0.003% eU; 875.

Russell, Unnumbered road 2.8 mi. NE of Plum Creek bridge in: radioactivity of red gneiss in granite gneiss and grano-syenite gneiss, estimated as 0.002-0.003% eU: 875.

Russell, Unnumbered road 4.3 and 5.1 mi. NE of Plum Creek bridge in: radioactivity of red granite gneiss and granite gneiss and grano-syenite gneiss, estimated as 0.002-0.004% eU: 875.

Sevey, New York Highway 56, 3-3.3 mi. N of, 1.6-1.9 mi. N of, and at junction with New York Highway 3: radioactivity of glacial cover on granite, estimated as 0.003-0.004% eU: 875.

Sevey, New York Highway 3, 2.3 mi. W of and 3 mi. W of junction with New York Highway 56: radioactivity of a granite and of a crystalline in granite, estimated as 0.003-0.004% eU: 875.

South Colton, New York Highway 56, 1.5 mi. N of bridge in: radioactivity of long outcrop of medium-grained granite gneiss, estimated as 0.002-0.004% eU: 875.

NEW YORK (contd.)

St. Lawrence County (contd.)
Radioactive Rocks
Adirondack Mountains

South Colton, New York Highway 56, 4.5-4.8 mi. S of bridge in: radioactivity of glacial cover on phacoidal granite gneiss, extends for about 0.3 mi., estimated as 0.003-0.004% eU, with average estimated as 0.002% eU: 875.

South Colton, New York Highway 56, 7.9 mi. S of bridge in: radioactivity of glacial cover on granite, estimated as 0.003-0.004% eU: 875.

South Colton, New York Highway 56, 8.9 mi. S of bridge in: radioactivity of dark gray granite in granite and amphibolite, estimated as 0.002-0.003% eU with average estimated as 0.002% eU: 875.

South Colton, New York Highway 56, 10-10.3 mi. S of bridge in: radioactivity of glacial cover on granite and amphibolite, estimated as 0.003-0.004 % eU: 875.

Star Lake, New York Highway 3, 0.1 mi. W of post office in: radioactivity of gneiss in pyroxene gneiss, estimated as 0.002-0.004% eU: 875.

Star Lake, New York Highway 3, 1.7 mi. W of post office in: radioactivity of glacial cover on hornblende granite gneiss, estimated as 0.002-0.009% eU with average estimated as 0.002-0.004% eU: 875.

Star Lake, New York Highway 3, 2.3 mi. W of post office in: radioactivity of gneiss in hornblende granite gneiss, estimated as 0.005% eU: 875.

NEW YORK (contd.)

St. Lawrence County (contd.)

Radioactive Rocks

Adirondack Mountains

Talcville, Unnumbered dirt road, 0.5-0.8 mi. W of bridge in: radioactivity of dump material from talc mine, in area of Grenville siliceous limestones, estimated as 0.006-0.010% eU: 875.

Wanakena, New York Highway 3, at junction with road to: radioactivity of gneiss in quartz syenite gneiss, estimated as 0.003-0.007% eU with average estimated as 0.004% eU: 875.

Wanakena, New York Highway 3, 0.3-0.6 mi. E of junction with road to: radioactivity of glacial cover on quartz syenite gneiss, estimated as 0.001-0.007% eU with average estimated as $\not{<}$ - 0.001% eU: 875.

Wanakena, New York Highway 3, 1.0 mi. and 0.8 mi. E of junction with road to: radioactivity of glacial cover on quartz syenite gneiss, estimated as 0.001-0.006% eU with average estimated as $\not{<}$ - 0.001% eU: 875.

Wanakena, New York Highway 3, 0.5 mi. W of road to: radioactivity of gneiss in quartz syenite gneiss, estimated as 0.006-0.007% eU with average estimated as 0.003-0.004% eU: 875.

Thorium Occurrences

Adirondack Mountains

Fine: analyses of two granite samples from different localities in area and called Fine A and Fine B; analysis of sample Fine A showed 0.005% eU and 0.002% U, with no indication of any radioactivity in any of its minerals; analysis of sample Fine B showed 0.006% eU, 0.002% U, and 0.004% ThO_2, and it contained traces of beryl, hematite, and weakly radioactive sphene: 875.

NEW YORK (contd.)

St. Lawrence County (contd.)

Thorium Occurrences

Adirondack Mountains

Talcville: analysis of pegmatite sample showed 0.050% eU, 0.043% U, and 0.02% ThO_2, and it contained traces of weakly radioactive allanite and very radioactive uraninite: 875.

Benson mines, 2 mi. E of Star Lake along New York Highway 3, operated by Jones and Laughlin Steel Corp.: uranium-bearing magnetite deposit; a low grade replacement body in microline granite gneiss; most radioactive parts of orebody were "disseminated garnet zone" and "blotchy garnet zone"; one sample of magnetite ore with allanite contained 0.017% eU but most of the rock and ore contained from 0.002 to 0.006% eU and an average of 0.005% eU: 843.

DeKalb Junction: uraninite in quartz in McLear pegmatite: 947.

DeKalb Junction, feldspar quarry $2\frac{1}{2}$ mi. from: uraninite in small cubes, some altered to thucolite: 1025.

Gouverneur: pegmatite first visited there by Shaub, who found small uraninite cubes there on a 1936 visit and later both cubes and small penetration twins up to 6-7 mm. in diameter; uraninite occurs in quartz, which is not smoky; quarry has two pegmatites of different ages, a potassium pegmatite at the top and a sodium type below, the lead ratio of the uraninite is similar to that for other eastern Canadian Shield occurrences, which show variations from 0.148 to 0.156; further investigations to be made of a white coating around uraninite, not yet analyzed and apparently an individual mineral: 831;

NEW YORK (contd.)

St. Lawrence County (contd.)

Thorium Occurrences

Gouverneur: uraninite; analyses made and results to be published later; relationship to other uraninites and other radioactive minerals in Ontario and Quebec, Canada, to be studied: 830; age determinations on uraninite gave 4.44% rare earths, 5.20% ThO_2 or 4.57% Th, 75.89% U_3O_8 or 68.90% U, and an age ratio of 0.1567: 828; Reservoir granite sill very similar to ordinary green syenite of Adirondack area at SW end where it plunges under limestone since it contains there, besides allanite, the peculiar green pyroxene and bronzite that characterize the syenite: 713.

Hammond quadrangle

Birch Creek, W side of: allanite in green granite sill in hornblende gneiss at SW end of Hyde granite mass: 683.

Chippewa Creek: allanite and tourmaline in Alexandria type granite mass along the creek: 683.

Richville Station: uraninite occurs as small cubes in McLear pegmatite in white rather than smoky quartz: 942; uraninite microchemical analysis made by Hecht gave: 5.20% ThO_2 (4.57% Th), 75.89% UO_2 (66.90% U) and the Pb-U-Th ratio is 0.156, making the geologic age 1094 m.y., Laurentian or middle Precambrian: 942.

Thucolite Occurrences

DeKalb Junction, feldspar quarry 2½ mi. from: uraninite in small cubes, some altered to thucolite: 1025.

Uraninite Occurrences

Adirondack Mountains

Talcville: analysis of pegmatite sample showed 0.050% eU, 0.043% U, and 0.02% ThO_2, and it contained traces of weakly radioactive allanite and very radioactive uraninite: 875.

Dekalb Junction: uraninite in quartz in McLear pegmatite: 947.

NEW YORK (contd.)

St. Lawrence County (contd.)

Uraninite Occurrences

DeKalb Junction, feldspar quarry 2½ mi. from: uraninite in small cubes, some altered to thucolite: 1025.

Gouverneur: pegmatite first visited by Shaub, who found small uraninite cubes there on a 1936 visit and, later, both cubes and small penetration twins up to 6-7 mm. in diameter; uraninite occurs in quartz, which is not smoky; quarry has two pegmatites of different ages, a potassium pegmatite at the top and a sodium type below, the lead ratio of the uraninite is similar to that for other eastern Canadian Shield occurrences, which show variations from 0.148 to 0.156; further investigations to be made of a white coating around the uraninite, not yet analyzed and apparently an individual mineral: 831; uraninite; analyses made and results to be published later; relationship to other uraninites and other radioactive minerals in Ontario and Quebec, Canada, to be studied: 830; age determinations on uraninite gave 4.44% rare earths, 5.20% ThO_2 or 4.57% Th, 75. 89% U_3O_8 or 68.90% U, and an age ratio of 0.1567: 828.

Richville Station: uraninite occurs as small cubes in McLear pegmatite in white rather than smoky quartz: 942; uraninite, microchemical analysis made by Hecht gave: 5.20% ThO_2 (4.57% Th), 75.89% UO_2 (66.90% U) and the Pb-U-Th ratio is 0.156, making the geologic age 1094 m.y., Laurentian or middle Precambrian: 942.

NEW YORK (contd.)

St. Lawrence County (contd.)
Uranium Occurrences
Adirondack Mountains
Benson Mines: analysis of granite showed 0.006% eU and 0.003% U, and it contained traces of weakly radioactive hematite: 875.
DePeyster: analysis of granite-gneiss sample showed 0.007% eU and 0.002% U, and it contained traces of weakly radioactive zircon: 875.
Fine: analyses of two granite samples from different localities in area and called Fine A and Fine B; analysis of sample Fine A showed 0.005% eU and 0.002% U, with no indication of any radioactivity in any of its minerals; analysis of sample Fine B showed 0.006% eU, 0.002% U, and 0.004% ThO_2, and it contained traces of beryl, hematite, and weakly radioactive sphene: 875.
Talcville: analysis of pegmatite sample showed 0.050% eU, 0.043% U, and 0.02% ThO_2, and it contained traces of weakly radioactive allanite and very radioactive uraninite: 875.
Benson mines, 2 mi. E of Star Lake along New York Highway 3, operated by Jones and Laughlin Steel Corp.: uranium-bearing magnetite deposit; a low grade replacement body in microcline granite gneiss; most radioactive parts of orebody were "disseminated garnet zone" and "blotchy garnet zone"; one sample of magnetite ore with allanite contained 0.017% eU but most of the rock and ore contained from 0.002 to 0.006% eU and an average of 0.005% eU: 843.
DeKalb Junction: uraninite in quartz in McLear pegmatite: 947.
DeKalb Junction, feldspar quarry 2½ mi. from: uraninite in small cubes, some altered to thucolite: 1025.

NEW YORK (contd.)

St. Lawrence County (contd.)
Uranium Occurrences
Gouverneur: pegmatite first visited by Shaub, who found small uraninite cubes there on a 1936 visit and, later, both cubes and small penetration twins up to 6-7 mm. in diameter; uraninite occurs in quartz, which is not smoky; quarry has two pegmatites of different ages, a potassium pegmatite at the top and a sodium type below; the lead ratio of the uraninite is similar to that for other eastern Canadian Shield occurrences, which show variations from 0.148 to 0.156; further investigations to be made of a white coating around the uraninite, not yet analyzed and apparently an individual mineral: 831; uraninite; analyses made and results to be published later; relationship to other uraninites and other radioactive minerals in Ontario and Quebec, Canada, to be studied: 830; age determinations on uraninite gave 4.44% rare earths, 5.20% ThO_2 or 4.57% Th, 75.89% U_3O_8 or 68.90% U, and an age ratio of 0.1567: 828.
Richville Station: uraninite occurs as small cubes in McLear pegmatite in white rather than smoky quartz: 942; uraninite, microchemical analysis made by Hecht gave: 5.20% ThO_2 (4.57% Th), 75.89% UO_2 (66.90% U) and the Pb-U-Th ratio is 0.156, making the geologic age 1094 m.y., Laurentian or middle Precambrian: 942.

NEW YORK (contd.)

St. Lawrence County (contd.)
Uranium Occurrences
Magnetite, Uranium-bearing
Benson mines, 2 mi. E of Star Lake along New York Highway 3, operated by Jones and Laughlin Steel Corp.: uranium-bearing magnetite deposit; a low grade replacement body in microcline granite gneiss; most radioactive parts of orebody were "disseminated garnet zone" and "blotchy garnet zone"; one sample of magnetite ore with allanite contained 0.017% eU but most of the rock and ore contained from 0.002-0.006% eU and an average of 0.005% eU: 843.

Saratoga County
Black Shale, Uranium-bearing
Ballston Spa, Roadcut just E of railroad crossing on unnumbered road through: radioactivity determinations on Canajoharie black shale of Middle Ordovician age: average radioactivity estimated as 0.002% eU; grab sample showed 0.001% eU and 0.001% U by chemical analysis; shale believed to be over 1100 ft. thick here but outcrops are rare because it weathers easily: 875.
Ravena, 1 3/4 mi. NW of: radioactivity determinations on Esopus black and gray shale of Middle Devonian age, estimated average radioactivity 0.002% eU; grab sample contained 0.002% eU and 0.001% U by chemical analysis: 875.
Radioactive Gas
Saratoga: radioactivity of water of springs ranged from 39 to 880 x 10^{-12} curies/liter while the maximum for the gas was 847 x 10^{-12} curies/liter: 903.
Saratoga Springs: radioactivity studies of 14 springs showed a range of: 3.4-84.7 x 10^{-11}g. Ra/liter for gas; 3.9-88.0 x 10^{-11}g. Ra/liter for water; and 1.7-76.9 x 10^{-11}g. Ra/liter for spring deposits: 869; and emanation in spring gas in microcuries per liter ranging from 0.00003 to 0.00084: 625.

NEW YORK (contd.)

Saratoga County (contd.)
Radioactive Gases
Saratoga Springs
Adams Spring: radioactivity of 11.7 x 10^{-11}g. Ra/liter for gas, 12.2 x 10^{-11}g. Ra/liter for water, 5.1 x 10^{-11}g. Ra/liter for water (activity due to dissolved radium salts), and 8.8 x 10^{-11}g. Ra/liter for spring deposits: 869.
Coesa Spring: radioactivity of 8.1 x 10^{-11}g. Ra/liter for gas, 9.7 x 10^{-11}g. Ra/liter for water, and 7.9 x 10^{-11}g. Ra/liter for spring deposits: 869.
Crystal Rock Spring: radioactivity of 84.7 x 10^{-11}g. Ra/liter for gas, 88.0 x 10^{-11}g. Ra/liter for water, and 0.9 x 10^{-11}g. Ra/liter for water (activity due to dissolved radium salts): 869.
Emperor Spring: radioactivity of 22.1 x 10^{-11}g. Ra/liter for gas, 7.0 x 10^{-11}g. Ra/liter for water, 6.8 x 10^{-11}g. Ra/liter for water (activity due to dissolved radium salts): 869.
Flat No. 2 Spring: radioactivity of 3.7 x 10^{-11}g. Ra/liter for gas, 5.0 x 10^{-11}g. Ra/liter for water, and 6.5 x 10^{-11}g. Ra/liter for spring deposits: 869.
Geyser Spring: radioactivity of 3.4 x 10^{-11}g. Ra/liter for gas, 3.9 x 10^{-11}g. Ra/liter for water, and 1.7 x 10^{-11}g. Ra/liter for spring deposits: 869.

NEW YORK (contd.)

Saratoga County (contd.)
Radioactive Gas
Saratoga Springs
Hathorn No. 1 Spring: radioactivity of 21.3 x 10^{-11}g. Ra/liter for gas, 14.2 x 10^{-11}g. Ra/liter for water, 4.2 x 10^{-11}g. Ra/liter for water (activity due to dissolved radium salts), and 76.9 x 10^{-11}g. Ra/liter for spring deposits: 869.
Hathorn No. 2 Spring: radioactivity of 5.1 x 10^{-11}g. Ra/liter for gas, 16.1 x 10^{-11}g. Ra/liter for water, and 9.9 x 10^{-11}g. Ra/liter for water (activity due to dissolved radium salts): 869.
Hathorn No. 3 Spring: radioactivity of 8.3 x 10^{-11}g. Ra/liter for gas, 6.6 x 10^{-11}g. Ra/liter for water, and 12.0 x 10^{-11}g. Ra/liter for spring deposits: 869.
New Red Spring: radioactivity of 8.0 x 10^{-11}g. Ra/liter for gas, and 4.3 x 10^{-11}g. Ra/liter for water: 869.
Pump Well No. 4: radioactivity of 67.8 x 10^{-11}g. Ra/liter for gas, 23.1 x 10^{-11}g. Ra/liter for water, 2.1 x 10^{-11}g. Ra/liter for water (activity due to dissolved radium salts), and 6.3 x 10^{-11}g. Ra/liter for spring deposits: 869.
Radioactive Rocks
Adirondack Mountains
Ballston Spa, Roadcut just E of railroad crossing on unnumbered road through: radioactivity determinations on Canajoharie black shale of Middle Ordovician age: average radioactivity estimated as 0.002% eU; grab sample showed 0.001% eU and 0.001% U by chemical analysis; shale believed to be over 1100 ft. thick here but outcrops are rare because it weathers easily: 875.

NEW YORK (contd.)

Saratoga County (contd.)
Radioactive Rocks
Adirondack Mountains
Conklingville Dam, Unnumbered road to Lake Luzerne 0.5 mi. E of: radioactivity of long outcrop of schist and gneiss in intimately mixed Grenville series and granite, estimated as 0.002-0.003% eU: 875.
Conklingville Dam, Unnumbered road to Lake Luzerne 3.1 to 3.2 mi. E of: radioactivity of glacial cover, which shows frequent anomalies, on intimately mixed Grenville series and granite, estimated as 0.003-0.004% eU with average estimated as 0.002% eU: 875.
Conklingville Dam, Unnumbered road 6.3 mi. W of: radioactivity of Adirondack gneiss, average estimated as 0.003% eU: 875.
Edinburg on unnumbered road to Lake Luzerne, 5.1 mi. S of junction with New York Highway 30 in Northville: radioactivity of glacial cover on Cambrian Potsdam sandstone, estimated as 0.002-0.003% eU with average estimated as 0.001% eU: 875.
Northville, Unnumbered road 11.1 mi. E of junction with New York Highway 30 in: radioactivity of glacial cover on Adirondack gneiss, estimated as 0.004% eU: 875.
Northville, Unnumbered road 11.3 to 11.5 mi. E of junction with New York Highway 30 in: radioactivity of long outcrop of Adirondack gneiss, estimated as 0.002-0.003% eU: 875.
Hudson Valley
Bemis Heights, New York Highway 423, 2 mi. W of: radioactivity of glacial cover on Rensselaer grit, estimated as 0.001-0.003% eU: 875.

NEW YORK (contd.)

Saratoga County (contd.)
Radioactive Rocks
Saratoga Springs
General: radioactivity of: volcanic rock, 1.2 x 10^{-12}g. Ra/g. rock; syenite, 1.62 x 10^{-12}g. Ra/g. rock; shale, 4.35 x 10^{-12}g. Ra/g. rock; cryptozoon rock, trace; sandstone, none; allanite, 35.5 x 10^{-12}g. Ra/g. rock: 657.

Radioactive Springs
Saratoga Springs: radioactivity studies of 14 springs showed a range of: 3.4-84.7 x 10^{-11}g. Ra/liter for gas; 3.9-88.0 x 10^{-11}g. Ra/liter for water; and 1.7-76.9 x 10^{-11}g. Ra/liter for spring deposits: 869; radioactivity studies of 14 springs showed emanation in spring gas in microcuries per liter ranging from 0.00003 to 0.00084; emanation in spring water in microcuries per liter ranging from 0.00004 to 0.00088; concentration of radium emanation in spring water in mache units per liter ranging from 0.11 to 2.38; and radium in spring water in micrograms per liter ranging from 0.000009 to 0.0001: 625; radioactivity of water of springs ranged from 39 to 880 x 10^{-12} curies/liter while the maximum for the gas was 847 x 10^{-12} curies/liter: 903; iron content of waters discussed: 656; minor elements in waters include Ra and Rn: 656; origin of most constituents in water, including K and Na, believed by R. J. Colony to be from solution from deep-seated primary rock by meteoric water supersaturated with carbon dioxide; Colony rejected a possible marine origin, which Baudisch favors: 656.
General: radioactivity determinations made on waters, spring deposits, and rocks; radioactivity in the water due solely to content of dissolved Ra and of Ra emanation; no U or Th content indicated in water, spring deposits, or rocks; description of methods and apparatus used: 657.

NEW YORK (contd.)

Saratoga County (contd.)
Radioactive Springs
Saratoga Springs
General: comparison with results found in 1914 by Moore and Whittemore; small increase in Ra content reported in 1939 experiments due either to difference in methods of measurement used or to slight variations in the water: 657. origin of Ra dissolved in the water is uncertain but it probably came from a uranium deposit and possible U deposits are being investigated; such a source deposit of uranium probably would be free of Th because of absence of Th emanation in the water: 657; radioactivity tests made on springs:
1. gases tested for Ra and Th emanations;
2. waters tested for total activity and for activity due to dissolved radium salts;
3. spring deposits tested for activity: 869;

methods used: 869; tabulation of results: 869.

Adams Spring: radioactivity of 11.7 x 10^{-11}g. Ra/liter for gas, 12.2 x 10^{-11}g. Ra/liter for water, 5.1 x 10^{-11}g. Ra/liter for water (activity due to dissolved radium salts) and 8.8 x 10^{-11}g. Ra/liter for spring deposits: 869; emanation in spring gas in microcuries per liter, 0.00011; emanation in spring water in microcuries per liter, 0.00012; concentration of radium emanation in spring water in mache units per liter, 0.32, radium in spring water in micrograms per liter, 0.00005: 625.

NEW YORK (contd.)

Saratoga County (contd.)
Radioactive Springs
Saratoga Springs

Coesa Spring: radioactivity of water, taken directly from well, 1.99 x 10^{-10}g. Ra/liter; 1914 test gave 0.9 x 10^{-10}g. Ra/liter: 657; emanation in spring gas in microcuries per liter, 0.00008; emanation in spring water in microcuries per liter, 0.00009; concentration of radium emanation in spring water in mache units per liter, 0.24: 625; radioactivity of 8.1 x 10^{-11}g. Ra/liter for gas, 9.7 x 10^{-11}g. Ra/liter for water, and 7.9 x 10^{-11}g. Ra/liter for spring deposits: 869.

Crystal Rock Spring: radioactivity of 84.7 x 10^{-11}g. Ra/liter for gas, 88.0 x 10^{-11}g. Ra/liter for water, and 0.9 x 10^{-11}g. Ra/liter for water (activity due to dissolved radium salts): 869; emanation in spring gas in microcuries per liter, 0.00084; emanation in spring water in microcuries per liter, 0.00088; concentration of radium emanation in spring water in mache units per liter, 2.38; radium in spring water in micrograms per liter, 0.000009: 625.

Emperor spring: radioactivity of water, 7.0 x 10^{-11}g. Ra/liter: 730; radioactivity of 22.1 x 10^{-11}g. Ra/liter for gas, 7.0 x 10^{-11}g. Ra/liter for water, 6.8 x 10^{-11}g. Ra/liter for water (activity due to dissolved radium salts): 869; emanation in spring gas in microcuries per liter, 0.00022; emanation in spring water in microcuries per liter, 0.00007; concentration of radium emanation in spring water in mache units per liter, 0.19; radium in spring water in micrograms per liter, 0.00006: 625.

NEW YORK (contd.)

Saratoga County (contd.)
Radioactive Springs
Saratoga Spring

Flat No. 2 Spring: radioactivity of 3.7 x 10^{-11}g. Ra/liter for gas, 5.0 x 10^{-11}g. Ra/liter for water, and 6.5 x 10^{-11}g. Ra/liter for spring deposits: 869.

Flat No. 2 Spring: emanation in spring gas in microcuries per liter, 0.00003; emanation in spring water in microcuries per liter, 0.00005; concentration of radium emanation in spring water in mache units per liter, 0.14: 625.

Geyser spring: radioactivity of water, 3.9 x 10^{-11}g. Ra/liter: 730; radioactivity of water, taken directly from well, 0.363 x 10^{-10}g. Ra/liter; 1914 test gave 0.6 x 10^{-10}g. Ra/liter: 657; radioactivity of 3.4 x 10^{-11}g. Ra/liter for gas, 3.9 x 10^{-11}g. Ra/liter for water, and 1.7 x 10^{-11}g. Ra/liter for spring deposits: 869; emanation in spring gas in microcuries per liter, 0.00003; emanation in spring water in microcuries per liter, 0.00004; concentration of radium emanation in spring water in mache units per liter, 0.11: 625.

Hathorn No. 1 Spring: radioactivity of water, taken directly from well, 2.84 x 10^{-10}g. Ra/liter; 1914 test gave 1.4 x 10^{-10}g. Ra/liter: 657; radioactivity of 21.3 x 10^{-11}g. Ra/liter for gas, 14.2 x 10^{-11}g. Ra/liter for water, 4.2 x 10^{-11}g. Ra/liter for water (activity due to dissolved radium salts), and 76.9 x 10^{-11}g. Ra/liter for spring deposits: 869; emanation in spring gas in microcuries per liter, 0.00021; emanation in spring water in microcuries per liter, 0.00014; concentration of radium emanation in spring water in mache units

NEW YORK (contd.)

Saratoga County (contd.)
Radioactive Springs
Saratoga Springs
Hathorn No. 1 Spring: per liter, 0.38; radium in spring water in micrograms per liter, 0.00004: 625.
Hathorn No. 2 Spring: radioactivity of water, 16.1 x 10^{-11}g. Ra/liter: 730; radioactivity of water, taken directly from well, 5.16 x 10^{-10}g. Ra/liter; 1914 test gave 1.6 x 10^{-10}g. Ra/liter: 657; radioactivity of 5.1 x 10^{-11}g. Ra/liter for gas, 16.1 x 10^{-11}g. Ra/liter for water, and 9.9 x 10^{-11}g. Ra/liter for water (activity due to dissolved radium salts): 869; emanation in spring gas in microcuries per liter, 0.00005; emanation in spring water in microcuries per liter, 0.00016; concentration of radium emanation in spring water in mache units per liter, 0.43; radium in spring water in micrograms per liter, 0.0001: 625.
Hathorn No. 3 Spring: radioactivity of 8.3 x 10^{-11}g. Ra/liter for gas, 6.6 x 10^{-11}g. Ra/liter for water, and 12.0 x 10^{-11}g. Ra/liter for spring deposits: 869; emanation in spring gas in microcuries per liter, 0.00008; emanation in spring water in microcuries per liter, 0.00006; concentration of radium emanation in spring water in mache units per liter, 0.16: 625.
Island Spring: radioactivity of 11.8 x 10^{-11}g. Ra/liter for water and 10.5 x 10^{-11}g. Ra/liter for spring deposits: 869; emanation in spring water in microcuries per liter, 0.00011; concentration of radium emanation in spring water in mache units per liter, 0.30: 625.
New Red Spring: radioactivity of 8.0 x 10^{-11}g. Ra/liter for gas, and 4.3 x 10^{-11}g. Ra/liter for water: 869; emanation in spring gas in microcuries per liter, 0.00004;

NEW YORK (contd.)

Saratoga County (contd.)
Radioactive Springs
Saratoga Springs
New Red Spring: concentration of radium emanation in spring water in mache units per liter, 0.11: 625.
New Shonts well: radioactivity of 11.3 x 10^{-11}g. Ra/liter for water: 869; emanation in spring water in microcuries per liter, 0.00011; concentration of radium emanation in spring water in mache units per liter, 0.30: 625.
Old Hathorn No. 2 Spring: radioactivity of two samples of water, taken from water bottled on Dec. 12, 1935, 2.5 and 3.8 x 10^{-10}g. Ra/liter; 1914 test gave 1.6 x 10^{-10}g. Ra/liter: 657.
Orenda Spring: radioactivity of water, taken directly from well, 1.24 x 10^{-10}g. Ra/liter: 657.
Peerless Spring: radioactivity of 6.0 x 10^{-11}g. Ra/liter for water: 869; emanation in spring water in microcuries per liter, 0.00006; concentration of radium emanation in spring water in mache units per liter, 0.16: 625.
Pump well No. 4: radioactivity of water, 23.1 x 10^{-11}g. Ra/liter: 730; radioactivity of 67.8 x 10^{-11}g. Ra/liter for gas, 23.1 x 10^{-11}g. Ra/liter for water, 2.1 x 10^{-11}g. Ra/liter for water (activity due to dissolved radium salts), and 6.3 x 10^{-11}g. Ra/liter for spring deposits: 869; emanation in spring gas in microcuries per liter, 0.00067; emanation in spring water in microcuries per liter, 0.00023; concentration of radium emanation in spring water in mache units per liter, 0.62; radium in spring

NEW YORK (contd.)

Saratoga County (contd.)
Radioactive Springs
Saratoga Springs
Pump Well No. 4:
water in micrograms per liter, 0.00002: 625.
Red Spring: radioactivity of water, taken directly from well, 0.25 x 10^{-10}g. Ra/liter: 657.
Radioactive Spring Deposits
Saratoga Springs: radioactivity studies of 14 springs showed a range of: 3.4-84.7 x 10^{-11}g. Ra/liter for gas; 3.9-88.0 x 10^{-11}g. Ra/liter for water; and 1.7-76.9 x 10^{-11}g. Ra/liter for spring deposits: 869.
Adams Spring: radioactivity of 11.7 x 10^{-11}g. Ra/liter for gas, 12.2 x 10^{-11}g. Ra/liter for water, 5.1 x 10^{-11}g. Ra/liter for water (activity due to dissolved radium salts), and 8.8 x 10^{-11}g. Ra/liter for spring deposits: 869.
Coesa Spring: radioactivity of 8.1 x 10^{-11}g. Ra/liter for gas, 9.7 x 10^{-11}g. Ra/liter for water, and 7.9 x 10^{-11}g. Ra/liter for spring deposits: 869.
Flat No. 2 Spring: radioactivity of 3.7 x 10^{-11}g. Ra/liter for gas, 5.0 x 10^{-11}g. Ra/liter for water, and 6.5 x 10^{-11}g. Ra/liter for spring deposits: 869.
Geyser Spring: radioactivity of 3.4 x 10^{-11}g. Ra/liter for gas, 3.9 x 10^{-11}g. Ra/liter for water, and 1.7 x 10^{-11}g. Ra/liter for spring deposits: 869.
Hathorn No. 1 Spring: radioactivity of 21.3 x 10^{-11}g. Ra/liter for gas, 14.2 x 10^{-11}g. Ra/liter for water, 4.2 x 10^{-11}g. Ra/liter for water (activity due to dissolved radium salts), and 76.9 x 10^{-11}g. Ra/liter for spring deposits: 869.

NEW YORK (contd.)

Saratoga County (contd.)
Radioactive Spring Deposits
Saratoga Springs
Hathorn No. 3 Spring: radioactivity of spring water deposit, 1.27 x 10^{-10}g. Ra/g.: 657; radioactivity of 8.3 x 10^{-11}g. Ra/liter for gas, 6.6 x 10^{-11}g, Ra/liter for water, and 12.0 x 10^{-11}g. Ra/liter for spring deposits: 869.
Island Spring: radioactivity of 11.8 x 10^{-11}g. Ra/liter for water and 10.5 x 10^{-11}g. Ra/liter for spring deposits: 869.
Lincoln Spring: radioactivity of spring water deposit, 0.80 x 10^{-10}g. Ra/g.: 657.
Orenda Spring: radioactivity of spring water deposit, 0.75 x 10^{-10}g. Ra/g.: 657.
Pump Well No. 4: radioactivity of 67.8 x 10^{-11}g. Ra/liter for gas, 23.1 x 10^{-11}g. Ra/liter for water, 2.1 x 10^{-11}g. Ra/liter for water (activity due to dissolved radium salts), and 6.3 x 10^{-11}g. Ra/liter for spring deposits: 869.
Uranium Occurrences
Ballston Spa, Roadcut just E of railroad crossing on unnumbered road through: radioactivity determinations on Canajoharie black shale of Middle Ordovician age: average radioactivity estimated as 0.002% eU; grab sample showed 0.001% eU and 0.001% U by chemical analysis; shale believed to be over 1100 ft. thick here but outcrops are rare because it weathers easily: 875.
Ravena, 1 3/4 mi. NW of: radioactivity determinations on Esopus black and gray shale of Middle Devonian age, estimated average radioactivity 0.002% eU; grab sample contained 0.002% eU and 0.001% U by chemical analysis: 875.

NEW YORK (contd.)

Saratoga County (contd.)
Uranium Occurrences
Black Shale, Uranium-bearing
Ballston Spa, Roadcut just E of railroad crossing on unnumbered road through: radioactivity determinations on Canajoharie black shale of Middle Ordovician age: average radioactivity estimated as 0.002% eU; grab sample showed 0.001% eU and 0.001% U by chemical analysis; shale believed to be over 1100 ft. thick here but outcrops are rare because it weathers easily: 875.
Ravena, 1 3/4 mi. NW of: radioactivity determinations on Esopus black and gray shale of Middle Devonian age, estimated average radioactivity 0.002% eU; grab sample contained 0.002% eU and 0.001% U by chemical analysis: 875.

Sullivan County
Radioactive Rocks
Hudson Valley
Wurtzboro, U.S. Highway 209, 4.4 mi. SW of: radioactivity of Onondaga Marcellous black shale estimated as 0.001-0.003% eU: 875.

Thorite Occurrences
See under individual county names and under Index III, Thorite Occurrences-New York: 1098.

Thorium Occurrences
See under individual county names and under Index III, Thorium Occurrences-New York: 11, 78, 104, 249, 633, 637, 640, 644, 652, 659, 662, 663, 666, 667, 676, 683, 693, 705, 710, 711, 712, 713, 720, 734, 745, 749, 760, 768, 775, 779, 784, 786, 807, 809, 810, 811, 827, 828, 830, 831, 834, 839, 842, 843, 845, 846, 850, 851, 870, 872, 875, 878, 879, 880, 882, 883, 884, 920, 921, 925, 942, 947, 948, 950, 960, 985, 994, 995, 996, 1005, 1021, 1025, 1027, 1030, 1033, 1034, 1043, 1046, 1056, 1094, 1098, 1103, 1105.

Thucolite Occurrences
See under individual county names and under Index III, Thucolite Occurrences-New York: 1025.

NEW YORK (contd.)

Torbernite Occurrences
See under individual county names and under Index III, Torbernite Occurrences-New York: 675, 784, 846, 1094, 1098.

Ulster County
Radioactive Rocks
Hudson Valley
Ellenville, U.S. Highway 209, 1.3 mi. N of junction with Highway 52 in: radioactivity of dark shales and sandstone in Onondaga Marcellous shale, estimated as 0.002-0.003% eU: 875.
Gardiner, N of, on New York Highway 32, 0.7 mi. N of Wallkill River Bridge: radioactivity of long outcrop of dark shales in Hudson River Snake Hill formation, estimated as 0.002-0.003% eU: 875.
Highland, U.S. Highway 9W, 3.3 and 3.9 mi. N of: radioactivity of slatey shale in Hudson River group of Ordovician age, estimated as 0.002-0.003% eU: 875.

Uraconite Occurrences
See under individual county names and under Index III, Uraconite Occurrences-New York: 675, 749, 758, 834, 838, 846, 1094, 1098.

Uraninite Occurrences
See under individual county names and under Index III, Uraninite Occurrences-New York: 681, 693, 749, 763, 768, 813, 828, 830, 831, 834, 838, 839, 845, 846, 875, 883, 942, 947, 995, 996, 1005, 1025, 1032, 1070, 1094, 1098, 1103.

NEW YORK

Uranite Occurrences
See under individual county names and under Index III, Uranite Occurrences-New York: 640.

Uranium Exploration
See under individual county names and under Index III, Uranium Exploration-New York: 875, 1086, 1101, 1107.

Uranium Occurrences
See under individual county names and under Index III, Uranium Occurrences-New York: 13, 78, 426, 634, 640, 659, 675, 681, 693, 705, 720, 722, 745, 749,758, 763, 768, 784, 813, 827, 828, 830, 831, 834, 838, 839, 841, 842, 843, 845, 846, 847, 850, 851, 870, 871, 872, 875, 879, 882, 883, 925, 942, 947, 948, 972, 986, 987, 995, 996, 1005, 1021, 1025, 1029, 1032, 1034, 1070, 1093, 1094, 1098, 1102, 1103, 1106, 1107, 1109.

Bibliography of U.S.G.S. Reports: 572, 1004.

Uranophane Occurrences
See under individual county names and under Index III, Uranophane Occurrences-New York: 675, 839, 846, 1032, 1094.

Uranothorite Occurrences
See under individual county names and under Index III, Uranothorite Occurrences-New York: 705, 720, 882, 1034.

Uranotile Occurrences
See under individual county names and under Index III, Uranotile Occurrences-New York: 749, 839.

Warren County
Allanite Occurrences
Loon Lake: allanite in quartzose augite syenite: 712.
Loon Lake, RR cut near, ½ mi. S of Loon Lake depot: allanite and titanite in very small amount in augite associated with syenite gneiss; allanite observed in only one thin section of hand specimen: 711.

NEW YORK (contd.)

Warren County (contd.)
Radioactive Rocks
Adirondack Mountains
Bakers Mills, New York Highway 8, 0.8 mi. SW of: radioactivity of long outcrop of granite, a facies of syenite granite series, estimated as 0.002-0.003% eU: 875.
Bakers Mills, New York Highway 8, 2.3 mi. SE of the church in: radioactivity of glacial cover on Grenville series, estimated as 0.001-0.004% eU with average estimated as ≮ - 0.002% eU: 875.
Bolton Landing, Unnumbered dirt road, 10 mi. NW from, and 1 mi. S of Schroon River bridge near River Bank: radioactivity of glacial cover in gneiss estimated as 0.002-0.004% eU: 875.
The Glen, New York Highway 28, 1.0 mi. S of: radioactivity of long outcrop and quarry of gray gneiss in Grenville syenite and granite, mixed gneisses, estimated as 0.002-0.003% eU: 875.
The Glen, New York Highway 28, 2.0 mi. N of: radioactivity of glacial cover on Grenville syenite and granite, mixed gneisses, estimated as 0.001-0.003% eU with average estimated as 0.002% eU: 875.
Graphite, New York Highway 8, 6.2 mi. SW of: radioactivity of gneiss and pegmatite in gneiss area, estimated as 0.006-0.009% eU: 875.
Hague, New York Highway 9N, 0.6 mi. N of junction with New York Highway 8 in: radioactivity of gneissic rocks in Grenville, limestone, quartzite, and schist area, estimated as 0.003% eU: 875.

NEW YORK (contd.)

Warren County (contd.)
Radioactive Rocks
Adirondack Mountains

Johnsburg, New York Highway 8, 0.9 mi. E of: radioactivity of glacial cover on granite, average estimated as 0.003% eU: 875.

Johnsburg, New York Highway 8, 1.6 mi. E of: radioactivity of gneiss in granite, estimated as 0.002-0.003% eU: 875.

Lake George, U.S. Highway 9, 1.4 N of junction with New York Highway 9N in: radioactivity of granite adjacent to gabbro dike in syenite area, estimated as 0.002-0.003% eU: 875.

Lake George, U.S. Highway 9, 2.0-3.0 mi. N of junction with New York Highway 9N in: radioactivity of long outcrop of crystalline rocks in granite and basic rocks in syenite area, estimated as 0.002-0.004% eU: 875.

Lake George, U.S. Highway 9, 3.2 mi. N of junction with New York Highway 9N in: radioactivity of basic intrusions in gray granite in a syenite and gabbro area, average estimated as 0.006% eU: 875.

Lake George, New York Highway 9L, 4.4 and 5.0 mi. E of junction with New York Highway 9N in: radioactivity of dark gneiss in a mixed syenite and granite, estimated as 0.003-0.004% eU: 875.

Lake Luzerne, New York Highway 9K, 4.8 and 5.0 mi. E of: radioactivity of gneiss in area of granite and glacial material, estimated as 0.002-0.003% eU: 875.

Lake Luzerne, New York Highway 9K, 7.4-7.5 mi. E of: radioactivity of glacial cover with glacial boulders on granite(?), estimated as 0.003-0.004% eU: 875.

Lake Luzerne near junction of New York Highways 418 and 9K: radioactivity of glacial cover on Grenville mixed metagabbro and granite, estimated as 0.002-0.003% eU: 875.

NEW YORK (contd.)

Warren County (contd.)
Radioactive Rocks
Adirondack Mountains

Stony Creek, New York Highway 418, 2.5 mi. E of: radioactivity of long outcrop of granite gneiss in medium-grained granite area, estimated as 0.001-0.004% eU with average estimated as 0.001% eU: 875.

Stony Creek, New York Highway 418, 2.8-2.9 mi. E of: radioactivity of glacial cover on medium-grained granite area, estimated as 0.001-0.004% eU with average estimated as 0.001% eU: 875.

Stony Creek, New York Highway 418, 3.9 mi. S of: radioactivity of glacial cover on medium-grained granite area, estimated as 0.001-0.003% eU with average estimated as 0.001-0.002% eU: 875.

Unnumbered road (9M?) to Pottersville, 1.9 mi. NW of junction with New York Highway 8: radioactivity of gneiss in Grenville gneisses, average estimated as 0.003% eU: 875.

Warrensburg, New York Highway 418, 4.1-4.2 mi. S of: radioactivity of granite gneiss in granite and glacial material, estimated as 0.002-0.003% eU; glacial bank here contained about 0.004% eU: 875.

Warrensburg, New York Highway 418, 5.1-6.1 mi. S of: radioactivity of granite in medium-grained granite and quartz syenite area, estimated as 0.001-0.003% eU with average estimated as 0.001% eU: 875.

Warrensburg, New York Highway 418, 7.1-8.1 mi. S of: radioactivity of glacial cover and granite in granite, quartz syenite, and glacial material

NEW YORK (contd.)

Warren County (contd.)
Radioactive Rocks
Adirondack Mountains
Warrensburg, New York Highway 418, 7.1-8.1 mi. S of: area, estimated as 0.002-0.003% eU with average estimated as 0.001% eU: 875.
Thorium Occurrences
Adirondack Mountains
Graphite: chemical analysis of pegmatite sample showed 0.016% eU, 0.002% U, and 0.05% ThO_2, and it contained traces of pyrite, beryl, weakly radioactive apatite, and zircon; chemical analysis of chloritized pegmatite showed 0.039% eU, 0.003% U, and 0.18% ThO_2, with no indication of radioactivity present in any of its minerals: 875.
Lake George: analysis of pegmatite sample showed 0.024% eU, 0.013% U, and 0.03% ThO_2, and it contained traces of rutile, weakly radioactive zircon, and very radioactive ilmenite; analysis of granite showed 0.004% eU, 0.002% U, and 0.001% ThO_2 and, in another analysis, 0.002% ThO_2, and it contained traces of beryl and weakly radioactive zircon: 875.
Loon Lake: allanite in quartzose augite syenite: 712.
Loon Lake, RR cut near, ½ mi. S of Loon Lake depot: allanite and titanite in very small amount of augite associated with syenite gneiss; allanite observed in only one thin section of hand specimen: 711.
Uranium Occurrences
Adirondack Mountains
Graphite: chemical analysis of pegmatite sample showed 0.016% eU, 0.002% U, and 0.05% ThO_2, and it contained traces of pyrite, beryl, weakly radioactive apatite, and zircon; chemical analysis of chloritized pegmatite showed 0.039% eU, 0.003% U, and 0.18% ThO_2, with no indication of radioactivity present in any of its minerals: 875.

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Warren County (contd.)
Uranium Occurrences
Adirondack Mountains
Lake George: analysis of pegmatite sample showed 0.024% eU, 0.013% U, and 0.03% ThO_2, and it contained traces of rutile, weakly radioactive zircon, and very radioactive ilmenite; analysis of granite showed 0.004% eU, 0.002% U, and 0.001 % ThO_2, and, in another analysis, 0.002% ThO_2, and it contained traces of beryl and weakly radioactive zircon: 875.

Washington County
Radioactive Rocks
Adirondack Mountains
Comstock, U.S. Highway 4, 0.3-0.4 mi. S of junction with New York Highway 40 in: radioactivity of glacial cover on gneiss, estimated as 0.002-0.003% eU: 875.
Fort Ann, U.S. Highway 4, 1.8-1.9 mi. NE of: radioactivity of gneiss, average estimated as 0.003% eU: 875.
Hudson Valley
Granville, New York Highway 22, 4.7 mi. S of: radioactivity of Silurian-Ordovician slate, estimated as 0.001-0.004% eU: 875.
Hampton and New York Highway 286 (22A), 1.3 mi. S of Hampton: radioactivity of slate in Ordovician Normanskill grit, estimated as 0.002-0.003% eU: 875.
Hartford, Highway 149 from, to 2.7 mi. to the east: radioactivity of Lower Silurian and Lower Cambrian slate, estimated as 0.002-0.004% eU; many outcrops: 875.
Middle Falls, unnumbered road E of, parallel to New York Highway 40, 4.0 mi. N of: radioactivity of Snake Hill

NEW YORK (contd.)

Washington County (contd.)
Radioactive Rocks
Hudson Valley
Middle Falls, unnumbered road E of, parallel to New York Highway 40, 4.0 mi. N of: shale, estimated as 0.002-0.004% eU; average for 6.6 mi. traverse along this road, 0.000-0.003% eU: 875.
Middle Granville, New York Highway 286, 1.8 mi. N of: radioactivity of Silurian-Ordovician slates, estimated as 0.002-0.003% eU; long outcrop: 875.
New York Highway 286 (22A), 1.7 mi. S of Fairhaven, Vermont, or 3 mi. N of Hampton: radioactivity of slate in Lower Cambrian Bomoseen grit, estimated as 0.002-0.003% eU: 875.
North Granville, New York Highway 40, 0.6 and 0.9 mi. E of: radioactivity of slate in Lower Cambrian slates, quartzites, grit, and some limestone and sandstone, estimated as 0.004-0.006% eU; large outcrops: 875.
U.S. Highway 4, 3.3 mi. W of Fairhaven, Vermont, or about 5 mi. E of Whitehall: radioactivity of iron-stained slates in Lower Cambrian slates, average estimated radioactivity, 0.002% eU, estimated radioactivity, 0.002-0.005% eU; radioactivity of sample, 0.002% eU and 0.001% U by chemical analysis: 875.
Slate, Uranium-bearing
Hudson Valley
U.S. Highway 4, 3.3 mi. W of Fairhaven, Vermont, or about 5 mi. E of Whitehall: radioactivity of iron-stained slates in Lower Cambrian slates, average estimated radioactivity, 0.002% eU, estimated radioactivity, 0.002-0.005% eU; radioactivity of sample, 0.002% eU and 0.001% U by chemical analysis: 875.

NEW YORK (contd.)

Washington County (contd.)
Uranium Occurrences
Hudson Valley
U.S. Highway 4, 3.3 mi. W of Fairhaven, Vermont, or about 5 mi. E of Whitehall: radioactivity of iron-stained slates in Lower Cambrian slates, average estimated radioactivity, 0.002% eU, estimated radioactivity, 0.002-0.005% eU; radioactivity of sample, 0.002% eU and 0.001% U by chemical analysis: 875.
Slate, Uranium-bearing
Hudson Valley
U.S. Highway 4, 3.3 mi. W of Fairhaven, Vermont, or about 5 mi. E of Whitehall: radioactivity of iron-stained slates in Lower Cambrian slates, average estimated radioactivity, 0.002% eU, estimated radioactivity, 0.002-0.005% eU; radioactivity of sample, 0.002% eU and 0.001% U by chemical analysis: 875.

Waters, Uranium-bearing
See under individual county names and under Index III, Waters, Uranium-bearing-New York: 722.

Wayne County
Radioactive Rocks
Fruitland ore pit, 0.6 mi. N of Fruitland: radiometric analysis made in the laboratory of Furnaceville iron ore member of Clinton formation, a hematitic limestone with abundant oolites of hematite, radioactivity of grab sample, 0.002% eU; no analysis for U or P_2O_5: 935.

NEW YORK (contd.)

Westchester County

Age Determinations

Bedford: two samples of metamict zircon both gave a probable geologic age of 375 ± 50 m.y. but activity of 32 ± 2 and 16.0 ± 0.5 alphas/mg/min. respectively: 821.

Allanite Occurrences

Bedford: allanite, cyrtolite: 78, 82; cyrtolite; allanite occurs sparingly in feldspar quarries: 1098; three large pegmatite masses intruded into the country rock, which is Bedford augen gneiss; among the minerals reported from the pegmatite of the Kinkel, Bullock, Hobby, McDonald, Buresch, and Kelt feldspar mines and quarries in this area, are: allanite, autunite, columbite, cyrtolite, gummite, torbernite, uraconite, uraninite(?), uranophane: 1094; allanite, autunite, cyrtolite, gummite, torbernite, uraconite, uraninite(?), uranophane, listed with other minerals for the Kinkel feldspar mine and Bullock, Hobby, McDonald, Buresch, and Kelt quarries: 846.

Cortlandt area near Peekskill: emery deposits occur in norite and sillimanite schist, and ore, according to Rogers, "is immediately associated with abnormal rocks, containing sillimanite, cordierite, garnet, quartz, or allanite, which are found nowhere else in the area, except around certain schist inclusions near Crugers.": 667.

Peekskill: allanite: 846.

Autunite Occurrences

Bedford: autunite, muscovite with tiny flakes of autunite, cyrtolite, uranophane, gummite, torbernite, uraconite: 675; allanite, autunite, cyrtolite, gummite, torbernite, uraconite, uraninite(?), uranophane, listed with other minerals for the Kinkel feldspar mine and Bullock, Hobby, McDonald, Buresch, and Kelt quarries: 846;

NEW YORK (contd.)

Westchester County

Autunite Occurrences

Bedford:

cyrtolite in pegmatite contained autunite, uraninite, U-galena; Pb content of cyrtolite has been determined as 0.33% by Emendorfer and as 0.374% by Muench, who also gave the U content as 7.29%, in making his Pb/U determinations, and the age as about 373 m.y.: 813; three large pegmatite masses intruded into the country rock, which is Bedford augen gneiss; among the minerals reported from the pegmatite of the Kinkel, Bullock, Hobby, McDonald, Buresch, and Kelt feldspar mines and quarries in this area are: allanite, autunite, columbite, cyrtolite, gummite, torbernite, uraconite, uraninite(?), uranophane: 1094.

Bedford, in feldspar quarries: autunite in pegmatite as tiny tabular flakes on feldspar: 847; autunite, as tiny lemon-yellow scales scattered over other minerals; gummite, usually as a thin orange ring encircling small black mass of uraninite; uranophane, altered from gummite and occurring either as a yellowish ring around gummite or as small rounded masses in tiny pits in feldspar completely replacing gummite: 1032.

Bedford quarry: small scales of autunite on uraninite with zircon but occurrences are rare: 763.

North Quarry: small autunite scales as traces on microcline and on uraninite, which is not very abundant and is associated with massive zircon: 681.

NEW YORK (contd.)

Westchester County (contd.)

Autunite Occurrences

Bedford

P. H. Kinkel quarry: autunite in flakes between mica sheets and feldspar cleavage openings in pegmatite veins; uraninite, with uranotile or uranophane on its surface as a powder or crust, found on the dump; no monazite or xenotime reported: 839.

Beta-Uranotile Occurrences

Bedford: schroeckingerite discovered by E. Armstrong is found to be beta-uranotile: 972.

Cyrtolite Occurrences

Bedford: allanite, cyrtolite: 78, 82; allanite, autunite, cyrtolite, gummite, torbernite, uraconite, uraninite(?), uranophane listed with other minerals for the Kinkel feldspar mine and Bullock, Hobby, McDonald, Buresch, and Kelt quarries: 846; autunite, muscovite with tiny flakes of autunite, cyrtolite, uranophane, gummite, torbernite, uraconite: 675; three large pegmatite masses intruded into the country rock, which is Bedford augen gneiss; among the minerals reported from the pegmatite of the Kinkel, Bullock, Hobby, McDonald, Buresch, and Kelt feldspar mines and quarries in this area are: allanite, autunite, columbite, cyrtolite, gummite, torbernite, uraconite, uraninite(?), uranophane: 1094; cyrtolite with small lacunae of uraninite, uraconite and other secondary uranium minerals in feldspar mine: 834; cyrtolite; allanite occurs sparingly in feldspar quarries: 1098; cyrtolite in pegmatite contained autunite, uraninite, U-galena; Pb content of cyrtolite has been determined as 0.33% by Emendorfer and as 0.374% by Muench, who also gave the U content as 7.29%, in making his Pb/U determinations, and the age as about 373 m.y.: 813; cyrtolite, average Pb/U ratio 0.051 and geologic age 376 m.y.: 948;

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Westchester County (contd.)

Cyrtolite Occurrences

Bedford: analysis of cyrtolite for age determinations gave an age ratio of 0.051, with Pb 0.374%, uranium 7.29%, and little thorium, which was not included in calculating age ratio: the cyrtolite is called Precambrian and, though its ratio is less than that for Precambrian Hybla cyrtolite, it agrees well with uraninite from the Branchville, Connecticut, pegmatite and may be classed with the Taconic uplift; uraninite from Hale quarry, Connecticut seems distinctly younger than that at Bedford and Branchville: 827; cyrtolite studied and analyzed; one specimen showed 0.374% Pb, 7.29% U, no Th, Pb/U ratio of 0.0513, atomic wt. of Pb 205.931, approximate age 400 m.y., and 0.029% S; second specimen showed 0.351% Pb, 6.73% U, no Th, Pb/U ratio 0.0522, atomic wt. of Pb 206.072, approximate age 400 m.y., and 0.030% S; description of methods used: 870; chemical analysis of cyrtolite gave 7.29% U, trace Th, and age of 360 or 340 m.y. and another analysis gave 6.73% U, no Th, and ages of 360 or 350 m.y. indicating an average age of 350 m.y. for the cyrtolite: 925; cyrtolite, rich in hafnium, chemically analyzed for uranium and lead, showed an average content of 0.374% Pb and 7.29% U, thus making the ratio of Pb to U, 0.051, and giving an age of approximately 373 m.y. for the mineral; Th was not indicated in chemical analyses but radioactive measurements suggested a trace, not over 1.5 to 2 mg. Th per g. U: 872;

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Westchester County (contd.)

Cyrtolite Occurrences

Bedford: studies made on atomic weight of lead from cyrtolite, of which Muench had previously determined the lead-uranium ratio to be 0.0513 (Pb 0.374, U 7.29, Th 0.0?); in estimating age of mineral, it is important to discover by determination of its atomic weight if the lead was derived wholly from disintegration of U, especially since the cyrtolite is almost or completely free of Th; methods used in making determinations described in detail; experimental result of present study shows that atomic weight of uranium lead from a cyrtolite specimen is 205.92 ± 0.02: 659; cyrtolite, analysis showed content of 0.374% Pb, 7.29% U, and no Th; approximate geologic age 381 m.y. and Pb/U ratio 0.051: 871.

P. H. Kinkel quarry: cyrtolite in pegmatite vein; chemical analysis gave U_2O_3 content of 1.14-4.35 but specimen from Mt. Antero, Colorado, gave 4.82; Bedford mineral resembles the Llano Co., Texas, type; cyrtolite contains minute dust-like black inclusions, probably uraninite, while lighter parts of specimens show yellow earthy or scaly uraconite; other minerals present include beryl, uraconite, formerly reported as uranotile but now shown to contain sulphur, and previously reported uraninite, which is the black core of the cyrtolite: 838.

Gummite Occurrences

Bedford: autunite, muscovite with tiny flakes of autunite, cyrtolite, uranophane, gummite, torbernite, uraconite: 675; three large pegmatite masses intruded into the country rock, which is Bedford augen gneiss; among the minerals reported from the pegmatite of the Kinkel, Bullock, Hobby, McDonald, Buresch, and Kelt feldspar mines and quarries in this area are: allanite, autunite, columbite, cyrtolite, gummite, torbernite, uraconite, uraninite(?), uranophane: 1094;

NEW YORK (contd.)

Westchester County (contd.)

Gummite Occurrences

Bedford: allanite, autunite, cyrtolite, gummite, torbernite, uraconite, uraninite(?), uranophane, listed with other minerals for the Kinkel feldspar mine and Bullock, Hobby, McDonald, Buresch, and Kelt quarries: 846.

Bedford, in feldspar quarries: autunite, as tiny lemon-yellow scales scattered over other minerals; gummite, usually as a thin orange ring encircling small black mass of uraninite; uranophane, altered from gummite and occurring either as a yellowish ring around gummite or as small rounded masses in tiny pits in feldspar completely replacing gummite: 1032.

Magnetite, Thorium-bearing

Camp Smith near Peekskill in Hudson Highlands: uraninite associated with magnetite and hornblende in basic pegmatite of Hudson Highlands over a sizable linear area which passes through footwall zone of the old Phillips pyrite mine, where the basic pegmatites are common within the several hundred feet of the orebody; the highest concentration of uranium in the area appears to be in three of these small pegmatites where magnetite also is present: 1005.

Magnetite, Uranium-bearing

Camp Smith near Peekskill in Hudson Highlands: uraninite associated with magnetite and hornblende in basic pegmatite of Hudson Highlands over a sizable linear area which passes through footwall zone of the old Phillips pyrite mine, where the basic pegmatites are common within the several hundred feet of the orebody the highest concentration of uranium in the area appears to be in

NEW YORK (contd.)

Westchester County (contd.)

Magnetite, Uranium-bearing

Camp Smith near Peekskill in Hudson Highlands: three of these small pegmatites where magnetite also is present: 1005; uranium minerals occur in a dark coarse-grained hornblendite and are intimately associated with magnetite; the occurrence has been of interest to geologists both because of its unusual geologic make-up, which differs from that of any other occurrence yet described, and because of its possible economic worth: 1107.

Monazite Occurrences

Croton Lake near Yorktown: monazite and sillimanite in mica schist: 1021; monazite: 846.

Quarry in Yorktown: monazite in quarry adjoining associated magnetic iron ore: 663.

Yorktown: monazite: 846, 950; monazite and sillimanite found in quarry, associated with magnetic iron and quartz; quarry to be worked for iron: 960.

Yorktown Heights: monazite in sillimanite boulders in mica schist: 676.

Pitchblende Occurrences

Bear Mountain Bridge road about 3/4 mi. NW of north boundary of Peekskill and 800 ft. S of the south tollhouse on the road: grains of pitchblende embedded in grey granite which outcrops in thin dikes with grey gneiss and often contains molybdenite: 1029; some pitchblende may be present in large grey granite boulder, 25 ft. E of road and directly opposite private road leading to Oldstone, the estate belonging to Collin Kemper; the gneiss begins its outcrop near this boulder, runs obliquely toward the road for 50 ft., and then borders road for 75 ft. and greatly exceeds granite in amount present: 1029.

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Westchester County (contd.)

Pitchblende Occurrences

Camp Smith near Peekskill in Hudson Highlands: pitchblende reported: 842.

Peekskill: pitchblende: 1098.

Radioactive Magnetite

DeLuca emery mine near Dickinson Pond 3 mi. SE of Peekskill: radioactivity of dense, fine-grained, magnetite-corundum rock in contact zone of Manhattan schist and gabbro, less than 0.03 mr/hr.: 843.

Holland Furnace near mouth of Peekskill Creek at S end of Jan Peck bridge: radioactivity of slag from site of old iron furnace, less than 0.03 mr/hr.: 843

Radioactive Rocks

Hudson Highlands

Camp Smith, W of, along U.S. Highway 6: radioactive area of quartz-feldspar-biotite gneisses probably in the Storm King granite; radioactivity limited to a few massive layers; radiometric and chemical analyses of two samples of biotite gneiss gave 0.006% eU and 0.005% U for first, 0.007% eU, no U reported for second; no Th reported from either sample: 842.

Schroeckingerite Occurrences

Bedford: schroeckingerite discovered by E. Armstrong is found to be beta-uranotile: 972.

P. H. Kinkel quarry: greenish yellow mineral in small fragments in pegmatite thought to be autunite but later determined to be schroeckingerite; optical and physical properties described: 634.

Thorium Occurrences

Bedford: allanite, cyrtolite: 78, 82; allanite, autunite, cyrtolite, gummite, torbernite, uraconite, uraninite(?), uranophane, listed with other minerals for the

NEW YORK (contd.)

Westchester County (contd.)
Thorium Occurrences
Bedford:
Kinkel feldspar mine and Bullock, Hobby, McDonald, Buresch, and Kelt quarries: 846; cyrtolite; allanite occurs sparingly in feldspar quarries: 1098; cyrtolite with small lacunae of uraninite, uraconite and other secondary uranium minerals in feldspar mine: 834; cyrtolite, rich in hafnium, chemically analyzed for uranium and lead, showed an average content of 0.374% Pb and 7.29% U, thus making the ratio of Pb to U, 0.051, and giving an age of approximately 373 m.y. for the mineral; Th was not indicated in chemical analyses but radioactive measurements suggested a trace, not over 1.5 to 2 mg. Th per g. U.: 872; analysis of cyrtolite for age determinations gave an age ratio of 0.051 with Pb 0.374%, uranium 7.29%, and little Th, which was not included in calculating age ratio; the cyrtolite is called Precambrian and, though its ratio is less than that for Precambrian hybla cyrtolite, it agrees well with uraninite from the Branchville, Connecticut, pegmatite and may be classed with the Taconic uplift; uraninite from Hale quarry, Connecticut seems distinctly younger than that at Bedford and Branchville: 827; cyrtolite studied and analyzed; one specimen showed 0.374% Pb, 7.29% U, no Th, Pb/U ratio 0.0513, atomic wt. of Pb 205.931, approximate age 400 m.y., and 0.029% S; second specimen showed 0.351% Pb, 6.73% U, no Th, Pb/U ratio 0.0522, atomic wt. of Pb 206.072, approximate age 400 m.y., and 0.030% S; description of methods used: 870; chemical analysis of cyrtolite gave 7.29% U, trace Th, and age of 360 or 340 m.y. and another analysis gave 6.73% U, no Th, and ages of 360 or 350 m.y. indicating an average age of 350 m.y. for the cyrtolite: 925;

NEW YORK (contd.)

Westchester County (contd.)
Thorium Occurrences
Bedford: studies made on atomic weight of lead from cyrtolite, of which Muench had previously determined the lead-uranium ratio to be 0.0513 (Pb 0.374, U 7.29, Th 0.0?); in estimating age of mineral, it is important to discover by determination of its atomic weight if the lead was derived wholly from disintegration of U, especially since the cyrtolite is almost or completely free of Th; methods used in making determinations described in detail; experimental result or present study shows that atomic weight of uranium lead from a cyrtolite specimen is 205.92 ± 0.02: 659; cyrtolite, average Pb/U ratio 0.051 and geologic age 376 m.y.: 948; three large pegmatite masses intruded into the country rock, which is Bedford augen gneiss; among the minerals reported from the pegmatite of the Kinkel, Bullock, Hobby, McDonald, Buresch, and Kelt feldspar mines and quarries in this area are: allanite, autunite, columbite, cyrtolite, gummite, torbernite, uraconite, uraninite(?), uranophane: 1094.
P. H. Kinkel quarry: autunite in flakes between mica sheets and feldspar cleavage openings in pegmatite veins; uraninite, with uranotile or uranophane on its surface as a powder or crust, found on dump; no monazite or xenotime reported: 839.
Camp Smith near Peekskill in Hudson Highlands: uraninite associated with magnetite and hornblende in basic pegmatite of Hudson Highlands over a sizable linear area which passes through footwall zone of the old

NEW YORK (contd.)

Westchester County (contd.)

Thorium Occurrences

Camp Smith near Peekskill in Hudson Highlands:

Phillips pyrite mine, where the basic pegmatites are common within the several hundred feet of the orebody; the highest concentration of uranium in the area appears to be in three of these small pegmatites where magnetite also is present: 1005; pitchblende reported: 842.

Cortlandt area near Peekskill: emery deposits occur in norite and sillimanite schist, and ore, according to Rogers, "is immediately associated with abnormal rocks, containing sillimanite, cordierite, garnet, quartz, or allanite, which are found nowhere else in the area, except around certain schist inclusions near Crugers ": 667.

Croton Lake near Yorktown: monazite and sillimanite in mica schist: 1021; monazite: 846.

Peekskill: allanite: 846; pitchblende: 1098.

Quarry in Yorktown: monazite in quarry adjoining associated magnetic iron ore: 663.

Yorktown: monazite: 846, 950; monazite and sillimanite found in quarry, associated with magnetic iron and quartz; quarry to be worked for iron: 960.

Yorktown Heights: monazite in sillimanite boulders in mica schist: 676.

Magnetite, Thorium-bearing

Camp Smith near Peekskill in Hudson Highlands: uraninite associated with magnetite and hornblende in basic pegmatite of Hudson Highlands over a sizable linear area which passes through footwall zone of the old Phillips pyrite mine, where the basic pegmatites are common within the several hundred feet of the orebody; the highest concentration of uranium in the area appears to be in three of these small pegmatites where magnetite also is present: 1005.

NEW YORK (contd.)

Westchester County (contd.)

Torbernite Occurrences

Bedford: autunite, muscovite with tiny flakes of autunite, cyrtolite, uranophane, gummite, torbernite, uraconite: 675; allanite, autunite, cyrtolite, gummite, torbernite, uraconite, uraninite(?), uranophane, listed with other minerals for the Kinkel feldspar mine and Bullock, Hobby, McDonald, Buresch, and Kelt quarries: 846; three large pegmatite masses intruded into the country rock, which is Bedford augen gneiss; among the minerals reported from the pegmatite of the Kinkel, Bullock, Hobby, McDonald, Buresch, and Kelt feldspar mines and quarries in this area are: allanite, autunite, columbite, cyrtolite, gummite, torbernite, uraconite, uraninite(?), uranophane: 1094.

P. H. Kinkel quarry: cyrtolite in pegmatite vein; chemical analysis gave U_2O_3 content of 1.14-4.35 but specimen from Mt. Antero, Colorado, gave 4.82; Bedford mineral resembles the Llano Co., Texas, type; cyrtolite contains minute dust-like black inclusions, probably uraninite, while lighter parts of specimens show yellow earthy or scaly uraconite; other minerals present include beryl, uraconite, formerly reported as uranotile but now shown to contain sulphur, and previously reported uraninite, which is the black core of the cyrtolite: 838.

Uraconite Occurrences

Bedford: autunite, muscovite with tiny flakes of autunite, cyrtolite, uranophane, gummite, torbernite, uraconite: 675;

NEW YORK (contd.)

Westchester County (contd.)

Uraconite Occurrences

Bedford:

allanite, autunite, cyrtolite, gummite, torbernite, uraconite, uraninite(?), uranophane, listed with other minerals for the Kinkel feldspar mine and Bullock, Hobby, McDonald, Buresch, and Kelt quarries: 846; cyrtolite with small lacunae of uraninite, uraconite and other secondary uranium minerals in feldspar mine: 834; three large pegmatite masses intruded into the country rock, which is Bedford augen gneiss; among the minerals reported from the pegmatite of the Kinkel, Bullock, Hobby, McDonald, Buresch, and Kelt feldspar mines and quarries in this area are: allanite, autunite, columbite, cyrtolite, gummite, torbernite, uraconite, uraninite(?), uranophane: 1094; uraconite; C. Frondel considers uraconite as "essentially a name without a mineral" stating that most specimens labelled uraconite in museum collections turn out to be zippeite or uranopilite: 758.

Uraninite Occurrences

Bedford: allanite, autunite, cyrtolite, gummite, torbernite, uraconite, uraninite(?), uranophane, listed with other minerals for the Kinkel feldspar mine and Bullock, Hobby, McDonald, Buresch, and Kelt quarries: 846; cyrtolite with small lacunae of uraninite, uraconite and other secondary uranium minerals in feldspar mine: 834; cyrtolite in pegmatite contained autunite, uraninite, U-galena; Pb content of cyrtolite has been determined as 0.33% by Emendorfer and as 0.374% by Muench, who also gave the U content as 7.29% in making his Pb/U determinations, and the age as about 373 m.y.: 813; three large pegmatite masses, intruded into the country rock, which is Bedford augen gneiss; among the minerals reported from the pegmatite of the Kinkel, Bullock, Hobby, McDonald, Buresch, and

NEW YORK (contd.)

Westchester County (contd.)

Uraninite Occurrences

Bedford:

Kelt feldspar mines and quarries in this area are: allanite, autunite, columbite, cyrtolite, gummite, torbernite, uraconite, uraninite(?), uranophane: 1094.

Bedford, in feldspar quarries: autunite, as tiny lemon-yellow scales scattered over other minerals; gummite, usually as a thin orange ring encircling small black mass of uraninite; uranophane altered from gummite and occurring either as a yellowish ring around gummite or as small rounded masses in tiny pits in feldspar completely replacing gummite: 1032.

Bedford quarry: small scales of autunite or uraninite with zircon but occurrences are rare: 763.

North Quarry: small autunite scales as traces on microcline and on uraninite, which is not very abundant and is associated with massive zircon: 681.

P. H. Kinkel quarry: autunite in flakes between mica sheets and feldspar cleavage openings in pegmatite veins; uraninite, with uranotile or uranophane on its surface as a powder or crust, found on the dump; no monazite or xenotime reported: 839; cyrtolite in pegmatite vein; chemical analysis gave U_2O_3 content of 1.14-4.35 but specimen from Mt. Antero, Colorado, gave 4.82; Bedford mineral resembles the Llano Co., Texas, type; cyrtolite contains minute dust-like black inclusions, probably uraninite, while lighter parts of specimens show yellow earthy or scaly uraconite;

NEW YORK (contd.)

Westchester County (contd.)

Uraninite Occurrences

Bedford

P. H. Kinkel quarry: other minerals present include beryl, uraconite, formerly reported as uranotile but now shown to contain sulphur, and previously reported uraninite, which is the black core of the cyrtolite: 838.

Camp Smith near Peekskill in Hudson Highlands: uraninite associated with magnetite and hornblende in basic pegmatite of Hudson Highlands over a sizable linear area which passes through footwall zone of the old Phillips pyrite mine, where the basic pegmatites are common within the several hundred feet of the orebody; the highest concentration of uranium in the area appears to be in three of these small pegmatites where magnetite also is present: 1005.

Mamaroneck Avenue near Hutchinson River Parkway on SE outskirts of White Plains: pegmatite dike with very decomposed, tiny black octahedrons of uraninite: 1070.

Uranium Occurrences

Bear Mountain Bridge road about 3/4 mi. NW of north boundary of Peekskill and 800 ft. S of the south tollhouse on the road: some pitchblende may be present in large grey granite boulder, 25 ft. E of road and directly opposite private road leading to Oldstone, the estate belonging to Collin Kemper; the gneiss begins its outcrop near this boulder, runs obliquely toward the road for 50 ft., and then borders road for 75 ft. and greatly exceeds granite in amount present: 1029; pitchblende grains embedded in grey granite which outcrops in thin dikes with grey gneiss and often contains molybdenite: 1029.

Bedford: allanite, cyrtolite: 78, 82; allanite, autunite, cyrtolite, gummite, torbernite, uraconite, uraninite(?), uranophane, listed with other minerals for the Kinkel feldspar mine and Bullock,

NEW YORK (contd.)

Westchester County (contd.)

Uranium Occurrences

Bedford:

Hobby, McDonald, Buresch, and Kelt quarries: 846; autunite, muscovite with tiny flakes of autunite, cyrtolite, uranophane, gummite, torbernite, uraconite: 675; three large pegmatite masses intruded into the country rock, which is Bedford augen gneiss; among the minerals reported from the pegmatite of the Kinkel, Bullock, Hobby, McDonald, Buresch, and Kelt feldspar mines and quarries in this area are: allanite, autunite, columbite, cyrtolite, gummite, torbernite, uraconite, uraninite(?), uranophane: 1094; cyrtolite in pegmatite contained autunite, uraninite, U-galena; Pb content of cyrtolite has been determined as 0.33% by Emendorfer and as 0.374% by Muench, who also gave the U content as 7.29%, in making his Pb/U determinations, and the age as about 373 m.y.: 813; cyrtolite with small lacunae of uraninite, uraconite and other secondary uranium minerals in feldspar mine: 834; cyrtolite, rich in hafnium, chemically analyzed for uranium and lead, showed an average content of 0.374% Pb and 7.29% U, thus making the ratio of Pb to U, 0.051, and giving an age of 373 m.y. for the mineral; Th was not indicated in chemical analyses but radioactive measurements suggested a trace, not over 1.5 to 2 mg. Th per g. U.: 872; cyrtolite studied and analyzed; one specimen showed 0.374% Pb, 7.29% U, no Th, Pb/U ratio 0.0513, atomic wt. of Pb 205.931, approximate age 400 m.y., and 0.029% S; second specimen showed 0.351% Pb, 6.73% U, no Th, Pb/U ratio 0.0522, atomic wt. of Pb 206.072, approximate age 400 m.y., and 0.030% S; description of methods used: 870.

NEW YORK (contd.)

Westchester County (contd.)
Uranium Occurrences
Bedford: analysis of cyrtolite for age determinations gave an age ratio of 0.051, with Pb 0.374%, U 7.29%, and little thorium, which was not included in calculating age ratio; the cyrtolite is called Precambrian and though its ratio is less than that for Precambrian Hybla cyrtolite, it agrees well with uraninite from the Branchville, Connecticut, pegmatite and may be classed with the Taconic uplift; uraninite from Hale quarry, Connecticut seems distinctly younger than that at Bedford and Branchville: 827; chemical analysis of cyrtolite gave 7.29% U, trace Th, and age of 360 or 340 m.y. and another analysis gave 6.73% U, no Th, and ages of 360 or 350 m.y., indicating an average age of 350 m.y. for the cyrtolite: 925; cyrtolite, analysis showed content of 0.374% Pb, 7.29% U, and no Th; approximate geologic age 381 m.y. and Pb/U ratio 0.051: 871; studies made on atomic weight of lead from cyrtolite, of which Muench had previously determined the lead-uranium ratio to be 0.0513 (Pb 0.374, U 7.29, Th 0.0?) ; in estimating age of mineral, it is important to discover by determination of its atomic weight if the lead was derived wholly from disintegration of U especially since the cyrtolite is almost or completely free of Th; methods used in making determinations described in detail; experimental result of present study shows that atomic weight of uranium lead from a cyrtolite specimen is 205.92 ± 0.02: 659; cyrtolite, average Pb/U ratio 0.051 and geologic age 376 m.y.: 948; schroeckingerite discovered by E. Armstrong is found to be beta-uranotile: 972; uraconite; C. Frondel considers uraconite as "essentially a name without a mineral" stating that most specimens labelled uraconite in museum collections turn out to be zippeite or uranopilite: 758;

NEW YORK (contd.)

Westchester County (contd.)
Uranium Occurrences
Bedford:
uranotile or beta-uranotile in pegmatites: 883.
Bedford, in feldspar quarries: autunite in pegmatite as tiny tabular flakes on feldspar: 847; autunite, as tiny lemon-yellow scales scattered over other minerals; gummite, usually as a thin orange ring encircling small black mass of uraninite; uranophane, altered from gummite and occurring either as a yellowish ring around gummite or as small rounded masses in tiny pits in feldspar completely replacing gummite: 1032.
Bedford Feldspar Co. pit, a few hundred feet N of Kinkel quarries in same deposit: pegmatite similar to that in Kinkel quarries but which contains less quartz with feldspar, beryl, uranium minerals, etc., than some parts of older quarries: 879.
Bedford quarry: small scales of autunite on uraninite with zircon but occurrences are rare: 763.
North Quarry: small autunite scales as traces on microcline and on uraninite, which is not very abundant and is associated with massive zircon: 681.
P. H. Kinkel quarry: autunite in flakes between mica sheets and feldspar cleavage openings in pegmatite veins; uraninite, with uranotile or uranophane on its surface as powder or crust, found on the dump; no monazite or xenotime reported: 839; cyrtolite in pegmatite vein; chemical analysis gave U_2O_3 content of 1.14-4.35 but specimen from Mt. Antero, Colorado, gave 4.82;

NEW YORK (contd.)

Westchester County (contd.)
Uranium Occurrences
Bedford
P. H. Kinkel quarry:
Bedford mineral resembles the Llano Co., Texas, type; cyrtolite contains minute dust-like black inclusions, probably uraninite, while lighter parts of specimens show yellow earthy or scaly uraconite; other minerals present include beryl, uraconite, formerly reported as uranotile but now shown to contain sulphur, and previously reported uraninite, which is the black core of the cyrtolite: 838; greenish yellow mineral in small fragments in pegmatite thought to be autunite but later determined to be schroeckingerite; optical and physical properties described: 634.
P. H. Kinkel quarries: pegmatite mass mined mostly for feldspar but also contains beryl, tourmaline, and several rare uranium minerals: 879.
Camp Smith near Peekskill in Hudson Highlands: pitchblende reported: 842; uraninite associated with magnetite and hornblende in basic pegmatite of Hudson Highlands over a sizable linear area which passes through footwall zone of the old Phillips pyrite mine, where the basic pegmatites are common within the several hundred feet of the orebody; the highest concentration of uranium in the area appears to be in three of these small pegmatites where magnetite also is present:1005; uranium discovered early in 1955 with some samples containing up to 11% U: 1109; uranium discovered there by Edward Chalmers; drilling operations in progress in 1955: 1102; uranium minerals occur in a dark coarse-grained hornblendite and are intimately associated with magnetite; the occurrence has been of interest to

NEW YORK (contd.)

Westchester County (contd.)
Uranium Occurrences
Camp Smith near Peekskill: geologists both because of its unusual geologic make-up, which differs from that of any other occurrence yet described, and because of its possible economic worth: 1107.
Camp Smith, W of, along U.S. Highway 6, in Hudson Highlands: radioactive area of quartz-feldspar-biotite gneisses probably in the Storm King granite; radioactivity limited to a few massive layers; radiometric and chemical analyses of two samples of biotite gneiss gave 0.006% eU and 0.005% U for first, 0.007% eU, no U reported for second; no Th reported from either sample: 842.
Mamaroneck Ave. near Hutchinson River Parkway on SE outskirts of White Plains: pegmatite dike with very decomposed, tiny black octahedrons of uraninite: 1070.
Peekskill: pitchblende: 1098.
Magnetite, Uranium-bearing
Camp Smith near Peekskill in Hudson Highlands: uraninite associated with magnetite and hornblende in basic pegmatite of Hudson Highlands over a sizable linear area which passes through footwall zone of the old Phillips pyrite mine, where the basic pegmatites are common within the several hundred feet of the orebody; the highest concentration of uranium in the area appears to be in three of these small pegmatites where magnetite also is present: 1005;

NEW YORK (contd.)

Westchester County (contd.)
Uranium Occurrences
Magnetite, Uranium-bearing
Camp Smith near Peekskill in Hudson Highlands: uranium minerals occur in a dark coarse-grained hornblendite and are intimately associated with magnetite; the occurrence has been of interest to geologists both because of its unusual geologic make-up, which differs from that of any other occurrence yet described, and because of its possible economic worth: 1107.
Uranophane Occurrences
Bedford: allanite, autunite, cyrtolite, gummite, torbernite, uraconite, uraninite(?), uranophane, listed with other minerals for the Kinkel feldspar mine and Bullock, Hobby, McDonald, Buresch, and Kelt quarries: 846; autunite, muscovite with tiny flakes of autunite, cyrtolite, uranophane, gummite, torbernite, uraconite: 675; three large pegmatite masses intruded into the country rock, which is Bedford augen gneiss; among the minerals reported from the pegmatite of the Kinkel, Bullock, Hobby, McDonald, Buresch, and Kelt feldspar mines and quarries in this area are: allanite, autunite, columbite, cyrtolite, gummite, torbernite, uraconite, uraninite(?), uranophane: 1094.
Bedford, in feldspar quarries: autunite, as tiny lemon-yellow scales scattered over other minerals; gummite, usually as a thin orange ring encircling small black mass of uraninite; uranophane, altered from gummite and occurring either as a yellowish ring around gummite or as small rounded masses in tiny pits in feldspar completely replacing gummite: 1032.
P. H. Kinkel quarry: autunite in flakes between mica sheets and feldspar cleavage openings in pegmatite veins; uraninite, with uranotile or uranophane on its

NEW YORK (contd.)

Westchester County (contd.)
Uranium Occurrences
Bedford
P. H. Kinkel quarry: surface as a powder or crust, found on the dump; no monazite or xenotime reported: 839.
Uranotile Occurrences
Bedford: uranotile or beta-uranotile in pegmatites: 883.
P. H. Kinkel quarry: autunite in flakes between mica sheets and feldspar cleavage openings in pegmatite veins; uraninite, with uranotile or uranophane on its surface as a powder or crust, found on the dump; no monazite or xenotime reported: 839.

Western Part
Black Shales, Uranium-bearing
Devonian black shales: radioactivity measurements were made at 28 localities on Devonian black shales, especially Dunkirk shale, which appears to contain 0.003-0.004% eU, based on field readings, and apparently decreases in radioactivity from west to east; decrease in radioactivity may be related to increase in silt content of shale and there may also be some relationship between the eU content and the thickness of the shale: 995.
Uranium Occurrences
Devonian black shales: radioactivity measurements were made at 28 localities on Devonian black shales, especially Dunkirk shale, which appears to contain 0.003-0.004% eU, based on field readings, and apparently

NEW YORK (contd.)

Western Part (contd.)

Uranium Occurrences

Devonian black shales: decreases in radioactivity from west to east; decrease in radioactivity may be related to increase in silt content of shale and there may also be some relationship between the eU content and the thickness of the shale: 995.

Black Shale, Uranium-bearing

Devonian black shales: radioactivity measurements were made at 28 localities on Devonian black shales, especially Dunkirk shale, which appears to contain 0.003-0.004% eU, based on field readings, and apparently decreases in radioactivity from west to east; decrease in radioactivity may be related to increase in silt content of shale and there may also be some relationship between the eU content and the thickness of the shale: 995.

Xenotime Occurrences

See under individual county names and under Index III, Xenotime Occurrences-New York: 693, 749, 768, 775, 784, 839, 845, 846, 875, 884, 1021, 1098.

NEW YORK (contd.)

Yates County

Radioactive Soil

Naples: radioactivity determinations on Volusa silt loam gave: at depths of 0-8 in., 0.93 x 10^{-12}g. Ra/g. soil and in a sample treated with sulfuric and hydrofluoric acids before testing, 3.76 x 10^{-12}g. Ra/g. soil; at depths of 8-36 in., 1.10 x 10^{-12}g. Ra/g. soil and no treated sample tested; the activity for the sample treated with acid is considered to be too high and probably the result of contamination since in other soils tested, the radioactivity of the acid-treated soil sample is lower; description of methods and apparatus used in making determinations: 868.

Yttrocerite Occurrences

See under individual county names and under Index III, Yttrocerite Occurrences-New York: 663, 779, 846, 1021.

OHIO

General
Black Shales, Uranium-bearing-
General: uranium in black shales: 426.
Chattanooga shale or its equivant: uranium-bearing black shale: 883.
Cleveland shale: may be a potential source of uranium since it is similar to uranium-bearing black shales: 824.
Huron shale: may be a potential source of uranium since it is similar to uranium-bearing black shales: 824.
Sunbury shale: may be a potential source of uranium since it is similar to uranium-bearing black shales: 824.
Coal, Uranium-bearing-
Eastern Part: 46 channel samples of nine commercially important bituminous coal beds and associated rocks in the Pennsylvanian system were collected for study in the U.S.G.S. laboratory; five samples contained 0.001% eU or more but the U content was lower; none of the samples collected contained recoverable quantities of U in the ash; no conclusions on relation of high radioactivity to position in depositional basin, post-depositional structure, or stratigraphy can be drawn from data presently available: 966.
Prospector's Guides-
Exploration methods: 1101.
Mining laws: 1101.
Uranium: 1101.
Radioactive Coal-
Eastern Part: 46 channel samples of nine commercially important bituminous coal beds and associated rocks in the Pottsville, Alleghany, and Monongahela series of the Pennsylvanian system were collected for study in the U.S.G.S. laboratory; five samples contained 0.001% eU or more but the U content

OHIO (contd.)

General (contd.)
Radioactive Coal-
Eastern Part:
was lower; none of the samples collected contained recoverable quantities of U in the ash; no conclusions on relation of high radioactivity to position in depositional basin, post-depositional structure, or stratigraphy can be drawn from data presently available: 966.
Radioactive Springs-
General: Ra emanation tended to increase as flow increased and to decrease as flow decreased: 904; Ra emanation content varied from time to time and was reduced after heavy rains which carry emanation back down into the soil: 904; two unnamed Ohio springs studied for a nine-month period confirmed these observations: 904.
Radioactivity-
Amount: radioactivity is not great but is high compared with ordinary springs from some localities; variations occur from spring to spring probably because some emanation had been given up before they issued from the ground: 903.
Measurement: description of apparatus and methods used: 903.
Possible causes: radium emanation picked up from traces of Ra in soil and rock through which water passes and dissolved in and passed out with the

OHIO (contd.)

General (contd.)
Radioactive Springs-
General-
Radioactivity-
Possible causes:. water:903;Ra salts dissolved in water: 903; presence of some product of the Th or Ac series: 903.
Results reported: emanation content given for water as taken from spring or well: 903.
Radioactive Water-
Radioactivity
Measurement: description of apparatus and methods used: 903.
Possible causes: radium emanation picked up from traces of Ra in soil and rock through which water passes and dissolved in and passed out with the water:903; Ra salts dissolved in water:903;presence of some product of the Th or Ac series: 903.
Results reported: emanation content given for water as taken from spring or well: 903.
Shales, Uranium-bearing-
Appalachian province, western edge: uranium-bearing shales in dissected plateau country: 883.
Uranium Exploration-
Methods: 1101.
Mining laws: 1101.
Prospector's guides: 1101.
Uranium Occurrences-
General-
General: uranium in black shales: 426.
Appalachian province, western edge: uranium-bearing shales in dissected plateau country: 883.
Appalachian region: one of the most promising and least prospected areas in the United States since

OHIO (contd.)

General (contd.)
Uranium Occurrences-
General-
Appalachian region: the Appalachians extend from Alabama and Georgia to Quebec and uranium minerals have been found in Alabama, Kentucky, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Tennessee and Vermont: 1093; some of the best uranium possibilities seem to lie in the long valleys of western New Jersey and eastern Pennsylvania and in the plateaus of Alabama, northern Kentucky, and Ohio: 1093.
Bibliography of U.S.G.S. reports: 1004.
Chattanooga shale or its equivalent: uranium-bearing black shale: 883.
Cleveland shale: may be a potential source of uranium since it is similar to uranium-bearing black shales: 824.
Eastern Part: 46 channel samples of nine commercially important bituminous coal beds and associated rocks in the Pottsville, Alleghany, and Monongahela series of the Pennsylvanian system were collected for study in the U.S.G.S. laboratory; five samples contained 0.001% eU or more but the U content was lower; none of the samples collected contained recoverable quantities of U in the ash; no conclusions on relation of high radioactivity to position in depositional basin, post-depositional

OHIO (contd.)

General (contd.)
Uranium Occurrences-
General-
Eastern Part: structure, or stratigraphy can be drawn from data presently available: 966.
Huron shale: may be a potential source of uranium since it is similar to uranium-bearing black shales: 824.
Sunbury shale: may be a potential source of uranium since it is similar to uranium-bearing black shales: 824.
Black Shales, Uranium-bearing-
General: uranium in black shales: 426.
Chattanooga shale or its equivalent: uranium-bearing black shale: 883.
Cleveland shale: may be a potential source of uranium since it is similar to uranium-bearing black shales: 824.
Huron shale: may be a potential source of uranium since it is similar to uranium-bearing black shales: 824.
Sunbury shale: may be a potential source of uranium since it is similar to uranium-bearing black shales: 824.
*Shale, Uranium-bearing-
Appalachian province, western edge: uranium-bearing shales in dissected plateau country: 883.
*Coal, Uranium-bearing
Eastern Part: 46 channel samples of nine commercially important bituminous coal beds and associated rocks in the Pottsville, Alleghany, and Monongahela series of the Pennsylvanian system were collected for study in the U.S.G.S. laboratory; five samples contained 0.001% eU or more but the U content was lower; none of the samples contained recoverable quantities of U in the ash; no conclusions on relation of high radioactivity to position in depositional basin can be drawn from data presently available: 966.

OHIO (contd.)

Athens County
Radioactive Coal-
Athens quadrangle-
Drift mine on Kimberly-Carbondale road, 0.8 miles SW of Kimberly: radioactivity of Upper Freeport No. 7 coal, in two coals separated by underclay, both less than 0.001% eU: 966.
Chesterhill quadrangle-
Gilchrest Coal Co. drift mine on U.S. Highway 50 alternate, 0.4 miles E of Sharpsburg: radioactivity of Pittsburgh No. 8 coal, less than 0.001% eU: 966.

Belmont County
Coal, Uranium-bearing-
Clairsville quadrangle-
Bradford Coal Co. truck mine at Crescent: radioactivity of Pittsburgh No. 8 coal, 0.002-0.003% eU, and by chemical analysis of a sample with 0.003% eU, 10.7% ash, 0.0010% U in ash, 0.0001% U in sample: 966.
Radioactive Coal-
Clairsville quadrangle-
Bradford Coal Co. truck mine at Crescent: radioactivity of Pittsburgh No. 8 coal, 0.002-0.003% eU, and by chemical analysis of a sample with 0.003% eU, 10.7% ash, 0.0010% U in ash, 0.0001% U in sample: 966.
Clarington quadrangle-
Powhattan Coal Co. slope mine, 0.2 miles N of Pipe Creek road, 4 miles W of Ohio Highway 7 at Pipe Creek: radioactivity of Flint Clay and underlying Pittsburgh No. 8 coal, both less than 0.001% eU: 966.

OHIO (contd.)

Belmont County (contd.)
Radioactive Coal-
Flushing quadrangle-
Lafferty Coal Co. strip mine, 0.4 miles S of Ohio Highway 331, 2.6 miles E of Flushing: radioactivity of Meigs Creek No. 9 coal, less than 0.001% eU: 966.
Truck mine of Bradford Coal Co. in C-N-NW Sec. 25, T. 7 N., R. 3 W.: radioactivity of Pittsburgh coal with two half-inch shale partings, 0.002 and 0.003% eU in two tests: 994
Woodsfield quadrangle-
Wells Coal Co. strip mine on SE side of hill 0.2 miles N of Shannon Run Road, 1 mile W of Barnesville: radioactivity of Meigs Creek No. 9 coal, less than 0.001% eU: 966.
Wells Coal Co. strip mine on W side of valley, 0.2 miles N of Shannon Run Road, 0.8 miles W of Barnesville: radioactivity of Pittsburgh No. 8 coal, less than 0.001% eU: 966.
Uranium Occurrences-
Clairsville quadrangle-
Bradford Coal Co. truck mine at Crescent: radioactivity of Pittsburgh No. 8 coal, 0.002-0.003% eU, and by chemical analysis of a sample with 0.003% eU, 10.7% ash, 0.0010% U in ash, 0.0001% U in sample: 966.
Coal, Uranium-bearing-
Clairsville quadrangle-
Bradford Coal Co. truck mine at Crescent: radioactivity of Pittsburgh No. 8 coal, 0.002-0.003% eU, and by chemical analysis of a sample with 0.003% eU, 10.7% ash, 0.0010% U in ash, 0.0001% U in sample: 966.

OHIO (contd.)

Bibliographies
Uranium Occurrences-
Bibliography of U.S.G.S. reports: 1004.

Black Shales, Uranium-bearing
Ohio-Black Shales, Uranium-bearing: See under individual county names and under Index III, Black Shales, Uranium-bearing-Ohio: 426, 824, 883, 1097.

Butler County
Radioactive Water
Oxford: city water, temperature, 19° C. and radioactivity, 70 x 10^{-12} curies/liter: 903.

Carbonaceous Deposits, Uranium-bearing
See under individual county names and under Index III, Carbonaceous Deposits, Uranium-bearing-Ohio: 1097.

Carroll County
Radioactive Coal
Abandoned strip pit of James Bros. Coal Co. in SW-SE-SW Sec. 33, T. 16 N., R. 7 W.: radioactivity of Middle Kittanning coal, 0.002% eU in two tests: 994.
Dover quadrangle
James Brothers Coal Co. strip mine, 0.2 mi. N of Lindentree: radioactivity of Lower Kittanning No. 5 coal, less than 0.001% eU: 966.
James Brothers Coal Co. strip mine (abandoned), 0.7 mi. SW of Lindentree: radioactivity reported for Middle Kittanning No. 6 coal and overlying fossiliferous shale containing pyrite nodules: for Middle Kittanning No. 6 coal beneath the shale, less than 0.001% eU: 966.
Shale, Uranium-bearing
Dover quadrangle
James Brothers Coal Co. strip mine (abandoned), 0.7 miles SW of Lindentree: radioactivity reported for Middle Kittanning No. 6 coal and overlying fossiliferous shale containing pyrite nodules: for shale 0.002-0.003% eU, and by

OHIO (contd.)

Carroll County (contd.)
Shale, Uranium-bearing
Dover quadrangle
James Brothers Coal Co. strip mine (abandoned), 0.7 miles SW of Lindentree: chemical analysis of a sample with 0.003% eU, 89.2% ash, 0.0005% U in ash, 0.0004% U in sample; for Middle Kittanning No. 6 coal beneath the shale, less than 0.001% eU: 966.

Uranium Occurrences
Dover quadrangle
James Brothers Coal Co. strip mine (abandoned), 0.7 miles SW of Lindentree: radioactivity reported for Middle Kittanning No. 6 coal and overlying fossiliferous shale containing pyrite nodules: for shale, 0.002-0.003% eU, and by chemical analysis of a sample with 0.003% eU, 89.2% ash, 0.0005% U in ash, 0.0004% U in sample; for Middle Kittanning No. 6 coal beneath the shale, less than 0.001% eU: 966.

Shales, Uranium-bearing
Dover quadrangle
James Brothers Coal Co. strip mine (abandoned), 0.7 miles SW of Lindentree: radioactivity reported for Middle Kittanning No. 6 coal and overlying fossiliferous shale containing pyrite nodules: for shale, 0.002-0.003% eU, and by chemical analysis of a sample with 0.003% eU, 89.2% ash, 0.0005% U in ash, 0.0004% U in sample; for Middle Kittanning No. 6 coal beneath the shale, less than 0.001% eU: 966.

OHIO (contd.)

Coal, Uranium-bearing
See under individual county names and under Index III, Coal, Uranium-bearing-Ohio: 966.

Columbiana County
Radioactive Coal
Columbiana quadrangle
Delauter Coal Co. strip mine, 0.3 mile W of Ohio Highway 165, 0.8 mile N of North Lima on Ohio Highway 164: radioactivity of Brookville No. 4 coal in a cannel coal and a coal separated by shale, both less than 0.001% eU: 966.
S. and S. Coal Co. strip mine on Ohio Highway 517, W of city limits of East Fairfield: radioactivity of Middle Kittanning No. 6 coal, less than 0.001% eU: 966.
Lisbon quadrangle
Weikert Coal Co. slope mine on Beaver Creek, 1.8 miles N of Ohio Highway 344 at Franklin Square: radioactivity of Lower Mercer No. 3 coal, less than 0.001% eU: 966.

Coshocton County
Radioactive Coal
Conesville quadrangle
Caley & Jennings drift mine, 3.7 miles SE of Coshocton on Ohio Highway 271: radioactivity of Middle Kittanning No. 6 coal, less than 0.001% eU: 966.

Cuyahoga County
Black Shale, Uranium-bearing
Bedford Reservation SE of Cleveland: a systematic search for germaniferous coals in the vicinity of the shale might prove rewarding: 1097; origin: the association of uranium and germanium in this coalified wood probably resulted from the fact that the wood or coalified wood was germanium-

OHIO (contd.)

Cuyahoga County (contd.)

Black Shale, Uranium-bearing

Bedford Reservation SE of Cleveland:

bearing when it floated into the basin of deposition of the Cleveland member of the Ohio shale and, once within the marine environment, absorbed the uranium, forming organo-uranium compounds like those found to exist in coals: 1097; spectrographic analyses of the ash of the coalified wood showed its vanadium and germanium content to be 1-5% and its uranium and nickel content, 0.1-0.5%; quantitative analyses, recorded in weight percent, gave 0.5% U and 2.0% Ge in the ash and 0.0085% U and 0.034% Ge in the dry coal and no Ni or V was reported in either the ash or dry coal: 1097; studies were made of the weathered vitrain, which is a coalified wood probably essentially corresponding in rank to high-volatile A bituminous coal, in the Cleveland member of the Ohio shale of Upper Devonian age: 1097.

Carbonaceous Deposits, Uranium-bearing

Bedford Reservation SE of Cleveland: a systematic search for germaniferous coals in the vicinity of the shale might prove rewarding: 1097; origin: the association of uranium and germanium in this coalified wood probably resulted from the fact that the wood or coalified wood was germanium-bearing when

OHIO (contd.)

Cuyahoga County (contd.)

Carbonaceous Deposits, Uranium-bearing

it floated into the basin of deposition of the Cleveland member of the Ohio shale and, once within the marine environment, absorbed the uranium, forming organo-uranium compounds like those found to exist in coals: 1097; spectrographic analyses of the ash of the coalified wood showed its vanadium and germanium content to be 1-5% and its uranium and nickel content, 0.1-0.5%; quantitative analyses, recorded in weight percent, gave 0.5% U and 2.0% Ge in the ash and 0.0085% U and 0.034% Ge in the dry coal and no Ni or V was reported in either the ash or dry coal: 1097; studies were made of the weathered vitrain, which is a coalified wood probably essentially corresponding in rank to high-volatile A bituminous coal, in the Cleveland member of the Ohio shale of Upper Devonian age: 1097.

Radioactive Rocks

Berea: sandstone gave radioactivity of 0.23×10^{-12} g.Ra/g. rock: 561; this sandstone selected as one of standard rock samples to be used in the international calibration of radioactivity: 561.

Cleveland: Berea sandstone of Mississippian age, mean value of radioactivity $0.23 \pm 0.01 \times 10^{-12}$ g.Ra/g. rock: 745.

Uranium Occurrences

Bedford Reservation SE of Cleveland: a systematic search for germaniferous coals in the vicinity of the shale might prove rewarding: 1097; origin: the association of uranium and germanium in this coalified wood probably resulted from the fact that the wood or coalified wood was germanium-bearing when it floated into the basin of deposition of the Cleveland member of the Ohio

OHIO (contd.)

Cuyahoga County (contd.)
Uranium Occurrences
shale and, once within the marine environment, absorbed the uranium forming organo-uranium compounds like those found to exist in coals: 1097; spectrographic analyses of the ash of the coalified wood showed its vanadium and germanium content to be 1-5% and its uranium and nickel content, 0.1-0.5%; quantitative analyses, recorded in weight percent, gave 0.5% U and 2.0% Ge in the ash and 0.0085% U and 0.034% Ge in the dry coal and no Ni or V was reported in either the ash or dry coal: 1097; studies were made of the weathered vitrain, which is a coalified wood probably essentially corresponding in rank to high-volatile A bituminous coal, in the Cleveland member of the Ohio shale of Upper Devonian age: 1097.
Black Shale, Uranium-bearing
Bedford Reservation SE of Cleveland: a systematic search for germaniferous coals in the vicinity of the shale might prove rewarding: 1097; origin: the association of uranium and germanium in this coalified wood probably resulted from the fact that the wood or coalified wood was germanium-bearing when it floated into the basin of deposition of the Cleveland member of the Ohio shale and, once within the marine environment, absorbed the uranium, forming organo-uranium compounds like those found to exist in coals: 1097; spectrographic analyses of the ash of the coalified wood showed its vanadium and germanium content to be 1-5% and its uranium and

OHIO (contd.)

Cuyahoga County (contd.)
Uranium Occurrences
Black Shale, Uranium-bearing
Bedford Reservation SE of Cleveland:
nickel content, 0.1-0.5%; quantitative analyses, recorded in weight percent, gave 0.5% U and 2.0% Ge in the dry coal and no Ni or V was reported in either the ash or dry coal: 1097; studies were made of the weathered vitrain, which is a coalified wood probably essentially corresponding in rank to high-volatile A bituminous coal, in the Cleveland member of the Ohio shale of Upper Devonian age: 1097.
Carbonaceous Deposits, Uranium-bearing
Bedford Reservation SE of Cleveland: a systematic search for germaniferous coals in the vicinity of the shale might prove rewarding: 1097; origin: the association of uranium and germanium in this coalified wood probably resulted from the fact that the wood or coalified wood was germanium-bearing when it floated into the basin of deposition of the Cleveland member of the Ohio shale and, once within the marine environment, absorbed the uranium, forming organo-uranium compounds like those found to exist in coals: 1097; spectrographic analyses of the ash of the coalified wood showed its vanadium and germanium content to be 1-5% and its uranium and nickel content, 0.1-0.5%; quantitative analyses, recorded in weight percent, gave 0.05% U and 2.0% Ge in the ash and 0.0085% U and 0.0034% Ge in the dry coal and no Ni or V was reported in either the ash or

OHIO (contd.)

Cuyahoga County (contd.)
Uranium Occurrences
Carbonaceous Deposits, Uranium-bearing
Bedford Reservation, SE of Cleveland:
dry coal: 1097; studies were made of the weathered vitrain, which is a coalified wood probably essentially corresponding in rank to high-volatile A bituminous coal, in the Cleveland member of the Ohio shale of Upper Devonian age: 1097.
Origin
Bedford Reservation, SE of Cleveland:
origin: the association of uranium and germanium in this coalified wood probably resulted from the fact that the wood or coalified wood was germanium-bearing when it floated into the basin of deposition of the Cleveland member of the Ohio shale and, once within the marine environment, absorbed the uranium forming organo-uranium compounds like those found to exist in coals: 1097; studies were made of the weathered vitrain, which is a coalified wood probably essentially corresponding in rank to high-volatile A bituminous coal, in the Cleveland member of the Ohio shale of Upper Devonian age: 1097.

OHIO (contd.)

Guernsey County
Radioactive Coal
Cambridge quadrangle
Rome Coal Co. drift mine, 0.7 miles S of U.S. Highway 40 on road 3.3 miles E of Cambridge: radioactivity of Upper Freeport No. 7 coal in two coals separated by bone coal, both less than 0.001% eU: 966.

Hamilton County
Uranium Processes
Site near Miami River NW of Cincinnati: plant to be constructed, including a uranium ore refinery, for production of uranium feed materials for use in U.S.A.E.C.'s fissionable material production plants; no weapons to be produced here and work will create no radiological hazards in area: 1057.
Uranium Production
Site near Miami River NW of Cincinnati: plant to be constructed, including a uranium ore refinery, for production of uranium feed materials for use in U.S.A.E.C.'s fissionable material production plants; no weapons to be produced here and work will create no radiological hazards in area: 1057.

Harrison County
Radioactive Coal
Cadiz quadrangle
Cadiz Coal Co. strip mine, 2.7 miles E of Cadiz on Cadiz-Smithfield road: radioactivity of Pittsburgh No. 8 coal, less than 0.001% eU: 966.
Youghiogheny & Ohio Coal Co. shaft mine on road 0.3 miles W of Wheeling & Lake Erie railroad, 0.7 miles N of Unionvale: radioactivity of Middle Kittanning No. 6 coal, less than 0.001% eU: 966.

OHIO (contd.)

Jackson County
Coal, Uranium-bearing
Jackson quadrangle
Broken Aro Coal Co. strip mine at east city limits of Latrobe: radioactivity reported for Brookville No. 4 coal and overlying impure cannel coal: for Brookville No. 4 coal, in two coals separated by impure coal and underclay, both less than 0.001% eU; for the overlying impure cannel coal, 0.001% eU, and, by chemical analysis of sample, 33.3% ash, 0.0031% U in ash, 0.0010% U in sample: 966.
Radioactive Coal
Jackson quadrangle
Broken Aro Coal Co. strip mine at east city limits of Latrobe: radioactivity reported for Brookville No. 4 coal and overlying impure cannel coal: for Brookville No. 4 coal, in two coals separated by impure coal and underclay, both less than 0.001% eU; for the overlying impure cannel coal, 0.001% eU, and, by chemical analysis of sample, 33.3% ash, 0.0031% U in ash, 0.0010% U in sample: 966.
Strip mine (abandoned) 0.4 miles N of Ohio Highway 124 on road 3 miles W of Jackson: radioactivity of Sharon No. 1 coal, less than 0.001% eU: 966.

OHIO (contd.)

Jackson County (contd.)
Uranium Occurrences
Jackson quadrangle
Broken Aro Coal Co. strip mine at east city limits of Latrobe: radioactivity reported for Brookville No. 4 coal and overlying impure cannel coal: for Brookville No. 4 coal, in two coals separated by impure coal and underclay, both less than 0.001% eU; for the overlying impure cannel coal, 0.001% eU, and, by chemical analysis of sample, 33.3% ash, 0.0031% U in ash, 0.0010% U in sample: 966.
Coal, Uranium-bearing
Jackson quadrangle
Broken Aro Coal Co. strip mine at east city limits of Latrobe: radioactivity reported for Brookville No. 4 coal and overlying impure cannel coal: for Brookville No. 4 coal, in two coals separated by impure coal and underclay, both less than 0.001% eU; for the overlying impure cannel coal, 0.001% eU, and, by chemical analysis of sample, 33.3% ash, 0.0031% U in ash, 0.0010% U in sample: 966.

Jefferson County
Radioactive Coal
Salineville quadrangle
John Ridzun drift mine on Yellow Creek valley road, 8.3 mi. E of Bergholz: radioactivity of Lower Freeport No. 6A coal, less than 0.001% eU: 966.
Reber Coal Co. strip mine, 0.2 mi. N of Yellow Creek valley road, 0.8 mi. E of Bergholz: radioactivity of Lower Kittanning No. 5 coal, less than 0.001% eU: 966.

OHIO (contd.)

Jefferson County (contd.)
Radioactive Coal
Salineville quadrangle
Strip mine (abandoned) on S side of hill, S of Yellow Creek, 1 mi. E of Bergholz: radioactivity of Upper Freeport No. 7 coal, less than 0.001% eU: 966.
Steubenville quadrangle
Huberta Coal Co. strip mine, 0.7 mi. S of U.S. Highway 22 on road W of city limits of Steubenville, 2.1 mi. W of Ohio River bridge: radioactivity of Pittsburgh No. 8 coal, less than 0.001% eU: 966.

Lawrence County
Radioactive Coal
Athalia quadrangle
Greasy Ridge Coal Co. strip mine, 0.3 mi. S of Greasy Ridge: radioactivity of Pittsburgh No. 8 coal, 0.001% eU in bone coal and less than 0.001% eU in underlying coal: 966.
Ironton quadrangle
Earl Carmen drift mine, 0.6 mi. S of Ohio Highway 75 on road 0.5 mi. S of Pedro: radioactivity of Brookville No. 4 coal, less than 0.001% eU: 966.
Oak Hill quadrangle
Dave Edward drift mine on Ohio Highway 75, 2.7 mi. S of Black Fork: radioactivity of Brookville No. 4 coal, in two coals separated by shale, both less than 0.001% eU: 966.

Mercer County
Radioactive Water
Celina: city water, temperature, 26° C. and radioactivity, 7 [or 7?] x 10^{-12} curies/liter: 903.

OHIO (contd.)

Monroe County
Radioactive Coal
Macksburg quadrangle
Joe Baker strip mine, 1.1 mi. W of Ohio Highway 145 on road at Stafford: radioactivity of Pittsburgh No. 8 coal, less than 0.001% eU: 966.

Muskingum County
Radioactive Coal
Philo quadrangle
Slack Coal Co. drift mine, 0.5 mi. S of U.S. Highway 22-40 on gravel road 3 mi. E of Zanesville: radioactivity of Middle Kittanning No. 6 coal in two coals separated by shale, both less than 0.001% eU: 966.
Zanesville quadrangle
Brun drift mine, 1.9 mi. W of Ohio Highway 555 on road 1.1 mi. N of Cannelville: radioactivity of Upper Freeport No. 7 coal, less than 0.001% eU: 966.

Origin of Uranium Occurrences
Ohio-Origin of Uranium Occurrences: See under individual county names and under Index III, Origin-Uranium Occurrences-Ohio: 1097.

Perry County
Radioactive Coal
Logan quadrangle
Dixie Coal Co. strip mine W of city limits of Dixie: radioactivity of Lower Kittanning No. 5 coal, less than 0.001% eU: 966.
Floyd Angle strip mine, 0.2 mi. N. of Bremen-Maxahala road, 5 mi. E of Crossenville: radioactivity of Middle Kittanning No. 6 coal, less than 0.001% eU: 966.

OHIO (contd.)

Portage County
Radioactive Coal
Ravena quadrangle
Peterson Coal Co. strip mine, 1 mi. W of Ohio Highway 225 in head of left fork of Willow Creek about 0.7 mi. S of U.S. Highway 224: radioactivity of Brookville No. 4 coal, less than 0.001% eU: 966.

Preble County
Radioactive Springs
Morning Sun
C. McQ. spring, 1 mi. SE of Morning Sun: temperature of water, 16° C. and radioactivity, 560 x 10^{-12} curies/liter: 903.
C.D. McQ. spring, 1 mi. W of Morning Sun: temperature of water, 15.8° C. and radioactivity, 250 x 10^{-12} curies/liter: 903.
C.D. McQ. spring (Wood), 1 mi. W of Morning Sun: temperature of water, 19.5° C. and radioactivity, 300 x 10^{-12} curies/liter: 903.
C.W. spring, 2 mi. W of Morning Sun: temperature of water, 19.5° C. and radioactivity, 140 x 10^{-12} curies/liter: 903.
I.B. spring, 0.5 mi. W of Morning Sun: temperature of water, not given, and radioactivity, 100 x 10^{-12} curies/liter: 903.
W.P. McQ. spring, 1 mi. W of Morning Sun: temperature of water, 17° C. and radioactivity, 610 x 10^{-12} curies/liter: 903.
South spring: temperature of water, 13° C. and radioactivity, 420 x 10^{-12} curies/liter: 903.

OHIO (contd.)

Preble County (contd.)
Radioactive Water
Morning Sun
C. McQ. well, 1 mi. S of Morning Sun: temperature of water, 13° C. and radioactivity, 200 x 10^{-12} curies/liter: 903.
J.S.R. Farm well, 1 mi. N of Morning Sun: temperature of water, not given, and radioactivity, 70 x 10^{-12} curies/liter: 903.
S.R.R. well: temperature of water, 15° C. and radioactivity, 95 x 10^{-12} curies/liter: 903.

Prospectors' Guides
Ohio-Prospectors' Guides: See under individual county names and under Index III, Prospectors' Guides-Ohio: 1101.

Radioactive Coal
Ohio-Radioactive Coal: See under individual county names and under Index III, Radioactive Coal-Ohio: 966, 994.

Radioactive Rocks
Ohio-Radioactive Rocks: See under individual county names and under Index III, Radioactive Rocks-Ohio: 561, 745.

Radioactive Springs
Ohio-Radioactive Springs: See under individual county names and under Index III, Radioactive Springs-Ohio: 903, 904.

Radioactive Water
Ohio-Radioactive Water: See under individual county names and under Index III, Radioactive Water-Ohio: 903.

Shales, Uranium-bearing
Ohio-Shales, Uranium-bearing: See under individual county names and under Index III, Shales, Uranium-bearing-Ohio: 883, 966.

OHIO (contd.)

Tuscarawas County
Radioactive Coal
Navarre quadrangle
Mallick Coal Co. strip mine, 0.4 mi. E of Ohio Highway 93 on road 2.2 mi. N of Dundee: radioactivity of Brookville No. 4 coal, less than 0.001% eU: 966.
Strip mine in head of valley, 1.1 mi. N of Ohio Highway 39 on gravel road 3 mi. W of Dover: radioactivity of Lower Kittanning No. 5 coal, less than 0.001% eU: 966.
Uhrichsville quadrangle
Midvale Coal Co. core from diamond drillhole 0.3 mi. N of Ohio Highway 39 on gravel road 7.3 mi. E of New Philadelphia: radioactivity reported for Middle Kittanning No. 6 coal and overlying fossiliferous shale: for shale, 0.003% eU, and, by chemical analysis of sample, 88.6% ash, 0.0008% U in ash, 0.0007% U in sample; for Middle Kittanning No. 6 coal beneath shale, less than 0.001% eU: 966.
Shales, Uranium-bearing
Uhrichsville quadrangle
Midvale Coal Co. core from diamond drillhole 0.3 mi. N of Ohio Highway 39 on gravel road 7.3 mi. E of New Philadelphia: radioactivity reported for Middle Kittanning No. 6 coal and overlying fossiliferous shale: for shale, 0.003% eU, and, by chemical analysis of sample, 88.6% ash, 0.0008% U in ash, 0.0007% U in sample; for Middle Kittanning No. 6 coal beneath shale, less than 0.001% eU: 966.

OHIO (contd.)

Tuscarawas County (contd.)
Uranium Occurrences
Uhrichsville quadrangle
Midvale Coal Co. core from diamond drillhole 0.3 mi. N of Ohio Highway 39 on gravel road 7.3 mi. E of New Philadelphia: radioactivity reported for Middle Kittanning No. 6 coal and overlying fossiliferous shale: for shale, 0.003% eU, and, by chemical analysis of sample, 88.6% ash, 0.0008% U in ash, 0.0007% U in sample; for Middle Kittanning No. 6 coal beneath shale, less than 0.001% eU: 966.
Shales, Uranium-bearing
Uhrichville quadrangle
Midvale Coal Co. core from diamond drillhole 0.3 mi. N of Ohio Highway 39 on gravel road 7.3 mi. E of New Philadelphia: radioactivity reported for Middle Kittanning No. 6 coal and overlying fossiliferous shale: for shale, 0.003% eU, and, by chemical analysis of sample, 88.6% ash, 0.0008% U in ash, 0.0007% U in sample; for Middle Kittanning No. 6 coal beneath shale, less than 0.001% eU: 966.

Uranium Exploration
Ohio-Uranium Exploration: See under individual county names and under Index III, Uranium Exploration-Ohio: 1101.

Uranium Occurrences
Ohio-Uranium Occurrences: See under individual county names and under Index III, Uranium Occurrences-Ohio: 426, 824, 883, 966, 1093, 1097.
Bibliography of U.S.G.S. reports: 1004.

OHIO (contd.)

Uranium Processes

Ohio-Uranium Processes: See under individual county names and under Index III, Uranium Processes-Ohio: 1057.

Uranium Production

Ohio-Uranium Production: See under individual county names and under Index III, Uranium Production-Ohio: 1057.

Vinton County

Radioactive Coal

Wilkesville quadrangle

Everett drift mine on Ohio Highway 324, 2.7 mi. SE of Dundas: radioactivity of Lower Kittanning No. 5 coal, less than 0.001% eU: 966.

Hippel Coal Co. strip mine on Ohio Highway 324, 2.5 mi. SE of Dundas: radioactivity of Middle Kittanning No. 6 coal, less than 0.001% eU: 966.

Strip mine (abandoned) on Ohio Highway 160, 1.2 mi. W of Oreton: radioactivity of Lower Mercer No. 3 coal, in three coals separated by shale, all less than 0.001% eU: 966.

PENNSYLVANIA

General

Allanite Occurrences

General: carnotite and allanite reported in state but no commercial deposits of radium ore are known: 635; allanite deposits are known in Colorado, New Jersey, New York, North Carolina, Pennsylvania, Texas, Virginia, and Wyoming; while most of the deposits, are of mineralogical interest only, commercial shipments have been made from Wyoming, Virginia and possibly North Carolina: 1105.

PENNSYLVANIA (contd.)

General (contd.)

Autunite Occurrences

General: autunite, carnotite, fergusonite, samarskite, torbernite, uraninite, and uranophane among uranium-bearing minerals found in state; localities unnamed; probably occur in quantities only of mineralogic interest: 975.

Eastern Part: autunite and torbernite in small concentrations in arkosic redbeds of the Stockton formation (Triassic) in southwest New Jersey and adjacent Pennsylvania; abnormal radioactivity without visible uranium minerals is also reported; uraniferous material occurs in distinctly limonitic lenses of light gray sandstone and pyrite is moderately abundant in one radioactive outcrop in a stream bed; limonite at other occurrences probably represents weathered iron sulphides; Lockatong argillite conformably overlies the Stockton arkose and black carbonaceous zones in lacustrine facies are radioactive but tests showed them to be low grade and not likely to yield profitable extraction; outcrops of Triassic beds are scarce except for a narrow belt along the Delaware River and their importance as uranium carriers has not been ascertained: 1005.

Black Shales, Uranium-bearing

General: uranium in black shales: 426.

Carbonaceous Shales, Uranium-bearing

Eastern part: a considerable proportion of carbonaceous shale lying on coal mine dumps in anthracite basins is feebly radioactive; even the best of it assays no more than several thousandths of a percent U_3O_8 but this minor amount in a large dump emits sufficient radiation to be recorded as an anomaly by an airborne scintillometer: 1005.

PENNSYLVANIA (contd.)

General (contd.)

Carnotite Occurrences

General: carnotite in Mauch Chunk sandstone beds of Pennsylvanian age, in deposits similar to those on Colorado Plateau: 1106; autunite, carnotite, fergusonite, samarskite, torbernite, uraninite, and uranophane among uranium-bearing minerals found in state; localities unnamed; probably occur in quantities only of mineralogic interest: 975.

Coal, Uranium-bearing

General: radioactivity studies were made by U.S.G.S. on coal and associated rocks in Beaver, Clearfield, and Jefferson Counties in 1953; of 56 localities visited, six showed radioactivity significantly greater than that of coal in other localities; samples from three areas in Beaver County showed a maximum respectively of 0.007, 0.014, and 0.005% eU and 0.007, 0.016, and 0.004% U; coal from three areas in Clearfield and Jefferson Counties ranged in maximum values from 0.003-0.004% eU and contained 0.002% U; description of field and laboratory procedures used in the studies; geology; stratigraphy; structure; factors affecting radioactivity: 748.

Southwest Part: a total of 80 samples from 20 localities, collected mainly from Freeport, Kittanning, and Pittsburgh coal beds; no field readings made were higher than 0.001% eU: 996.

Western Part: reconnaissance radioactivity examination of 360 coal samples from 86 mines in Allegheny, Butler, Cambria, Clarion, Clearfield, Indiana, Jefferson, Lawrence, Mercer, Somerset, and Westmoreland counties; the beds sampled were the Brookfield, Lower and Upper Clarion, Lower, Middle, and Upper Kittanning, and Lower and Upper Freeport of the Allegheny series, the Bakerstown of the Conemaugh series; none of the coal beds showed more than 0.002% eU; in Clearfield county a thin bone layer overlying the Upper Freeport bed showed as much as 0.040% eU but no

PENNSYLVANIA (contd.)

General (contd.)

Coal, Uranium-bearing

Western Part:

unusual radioactivity was shown by coal immediately above the bone layer or other coals above, below, and on either side of the locality for a distance of two miles: 995; commercially important bituminous coal beds and associated rocks in the Pottsville, Allegheny, and Monongahela series of the Pennsylvanian system were examined for radioactivity with a portable scintillation counter and samples were collected at 104 localities; samples of overlying shale and underlying clay were not taken unless a radioactivity comparable to more than 0.002% eU was indicated by counter reading: coal and rock from 103 localities were almost non-radioactive and interpreted to contain essentially no uranium: 893; radioactive coal occurred only in one locality in Clearfield County where the upper 0.4 ft. of the Lower Freeport coal bed, which is 3.2 ft. thick, contained an average of 0.19% U: 893; black carbonaceous shales were also checked and a few samples collected but no abnormal radioactivity was found: 893.

Cyrtolite Occurrences

General: cyrtolite from five unnamed localities: 834.

Fergusonite Occurrences

General: autunite, carnotite, fergusonite, samarskite, torbernite, uraninite, and uranophane among uranium-bearing minerals found in state; localities unnamed; probably occur in quantities only of mineralogic interest: 975.

PENNSYLVANIA (contd.)

General (contd.)

Geophysical Exploration (Airborne)

Eastern part: considerable proportion of carbonaceous shale lying on coal mine dumps in anthracite basins is feebly radioactive; even the best of it assays no more than several thousandths of a percent U_3O_8 but this minor amount in a large dump emits sufficient radiation to be recorded as an anomaly by an airborne scintillometer: 1005.

Iron Deposits, Uranium-bearing

Eastern part: autunite and torbernite in small concentrations in arkosic redbeds of the Stockton formation (Triassic) in southwest New Jersey and adjacent Pennsylvania; abnormal radioactivity without visible uranium minerals is also reported; uraniferous material occurs in distinctly limonitic lenses of light gray sandstone and pyrite is moderately abundant in one radioactive outcrop in a stream bed; limonite at other occurrences probably represents weathered iron sulphides; Lockatong argillite conformably overlies the Stockton arkose and black carbonaceous zones in lacustrine facies are radioactive but tests showed them to be low grade and not likely to yield profitable extraction; outcrops of Triassic beds are scarce except for a narrow belt along the Delaware River and their importance as uranium carriers has not been ascertained: 1005.

Prospectors' Guides

Exploration methods: 1101.

Mining Laws: 1101.

Uranium: 1101.

Radioactive Carbonaceous Deposits

Eastern Part: autunite and torbernite in small concentrations in arkosic redbeds of the Stockton formation (Triassic) in southwest New Jersey and adjacent Pennsylvania; abnormal radioactivity without visible uranium minerals is also reported; uraniferous

PENNSYLVANIA (contd.)

General (contd)

Radioactive Carbonaceous Deposits

Eastern part:

material occurs in distinctly limonitic lenses of light gray sandstone and pyrite is moderately abundant in one radioactive outcrop in a stream bed; limonite at other occurrences probably represents weathered iron sulphides; Lockatong argillite conformably overlies the Stockton arkose and black carbonaceous zones in lacustrine facies are radioactive but tests showed them to be low grade and not likely to yield profitable extraction; outcrops of Triassic beds are scarce except for a narrow belt along the Delaware River and their importance as uranium carriers has not been ascertained: 1005.

Radioactive Carbonaceous Shale

Eastern part: a considerable proportion of carbonaceous shale lying on coal mine dumps in anthracite basins is feebly radioactive; even the best of it assays no more than several thousandths of a percent U_3O_8 but this minor amount in a large dump emits sufficient radiation to be recorded as an anomaly by an airborne scintillometer: 1005.

Radioactive Coal

General: radioactivity studies were made by U.S.G.S. on coal and associated rocks in Beaver, Clearfield, and Jefferson Counties in 1953; of 56 localities visited, six showed radioactivity significantly greater than that of coal in other localities; samples from three areas in Beaver County showed a maximum respectively of 0.007, 0.014,

PENNSYLVANIA (contd.)

General (contd.)
Radioactive Coal
General:
and 0.005% eU and 0.007, 0.016, and 0.004% U: coal from three areas in Clearfield and Jefferson Counties ranged in maximum values from 0.003-0.004% eU and contained 0.002% U; description of field and laboratory procedures used in the studies; geology; stratigraphy; structure; factors affecting radioactivity: 748.
Eastern Part: radioactivity determinations were made on 150 samples of coal and 3 samples of shale collected from the Pottsville, Allegheny, and Conemaugh formations of the Pennsylvanian system in the Southern, Eastern Middle, Western Middle, and Northern Fields, four anthracite coal fields; geology and complex structure of fields described; radioactivity of samples was measured with portable scintillation counter in mr./hr. and equivalent uranium content, determined in the field with portable assay equipment; radioactivity found ranged from background count to 0.001% eU in the coal and from 0.001-0.003% eU in the shale, too low to be of economic interest at present, so no further exploration seems warranted at this time: 1011.
Western Part: commercially important bituminous coal beds and associated rocks in the Pottsville, Allegheny, and Monongahela series of the Pennsylvanian system were examined for radioactivity with a portable scintillation counter and samples were collected at 104 localities; samples of overlying shale and underlying clay were not taken unless a radioactivity comparable to more than 0.002% eU was indicated by counter reading; coal and rock from 103 localities were almost non-radioactive and interpreted to contain essentially no uranium: 893;

PENNSYLVANIA (contd.)

General (contd.)
Radioactive Coal
Western Part: radioactive coal occurred only in one locality in Clearfield County where the upper 0.4 ft. of the Lower Freeport coal bed, which is 3.2 ft. thick, contained an average of 0.019% U: 893; black carbonaceous shales were also checked and a few samples collected but no abnormal radioactivity was found: 893.
Radioactive Minerals
General: mineralogic studies on radioactivity of many Pennsylvania minerals; methods described; effects on photographic plates; characteristics; localities where found: 1018.
Radioactive Rocks
General: radioactivity studies were made by U.S.G.S. on coal and associated rocks in Beaver, Clearfield, and Jefferson Counties in 1953; of 56 localities visited, six showed radioactivity significantly greater than that of coal in other localities; samples from three areas in Beaver County showed a maximum respectively of 0.007, 0.014, and 0.005% eU and 0.007, 0.016, and 0.004% U; coal from three areas in Clearfield and Jefferson Counties ranged in maximum values from 0.003-0.004% eU and contained 0.002% U; description of field and laboratory procedures used in the studies; geology; stratigraphy; structure; factors affecting radioactivity: 748; the Clinton formation of Silurian age was examined radiometrically by U.S.G.S. geologists at 31 localities in Maryland, New Jersey, New York, and Pennsylvania, with particular

PENNSYLVANIA (contd.)

General (contd.)
Radioactive Rocks
General:
attention to the phosphatic and hematitic parts of the formation; none of the places tested showed abnormal radioactivity or suggested a concentration of radioactive elements in excess of 0.004% eU, which was also the maximum radioactivity of samples tested; no samples contained more than 0.001% U; no further work planned by U.S.G.S.: 935.
Eastern Part: radioactivity determinations were made on 150 samples of coal and 3 samples of shale collected from the Pottsville, Allegheny, and Conemaugh formations of the Pennsylvanian system in the Southern, Eastern Middle, Western Middle, and Northern Fields, four anthracite coal fields; geology and complex structure of fields described; radioactivity of samples was measured with portable scintillation counter in mr./hr. and equivalent uranium content, determined in the field with portable assay equipment radioactivity found ranged from background count to 0.001% eU in the coal and from 0.001-0.003% eU in the shale, too low to be of economic interest at present, so no further exploration seems warranted at this time: 1011.
Samarskite Occurrences
General: autunite, carnotite, fergusonite, samarskite, torbernite, uraninite, and uranophane among uranium-bearing minerals found in state; localities unnamed; probably occur in quantities only of mineralogic interest: 975.
Thorium Occurrences
General: allanite deposits are known in Colorado, New Jersey, New York, North Carolina, Pennsylvania, Texas, Virginia, and Wyoming; while most of the deposits are of mineralogical interest only, commercial

PENNSYLVANIA (contd.)

General (contd.)
Thorium Occurrences
General:
shipments have been made from Wyoming, Virginia, and possibly North Carolina: 1105; autunite, carnotite, fergusonite, samarskite, torbernite, uraninite, and uranophane among uranium-bearing minerals found in state; localities unnamed; probably occur in quantities only of mineralogic interest: 975; carnotite and allanite reported in state but no commercial deposits of radium ore known: 635; cyrtolite from five unnamed localities: 834.
Titaniferous Magnetite, Uranium-bearing
General: a deposit of titaniferous magnetite (location not named) in schist contains auxiliary uranium: 1005.
Torbernite Occurrences
General: autunite, carnotite, fergusonite, samarskite, torbernite, uraninite, and uranophane among uranium-bearing minerals found in state; localities unnamed; probably occur in quantities only of mineralogic interest: 975.
Eastern Part: autunite and torbernite in small concentrations in arkosic redbeds of the Stockton formation (Triassic) in southwest New Jersey and adjacent Pennsylvania; abnormal radioactivity without visible uranium minerals is also reported; uraniferous material occurs in distinctly limonitic lenses of light gray sandstone and pyrite is moderately abundant in one radioactive outcrop in a stream bed; limonite at other occurrences probably represents weathered iron sulphides; Lockatong argillite conformably overlies

PENNSYLVANIA (contd.)

General (contd.)
Torbernite Occurrences
Eastern Part:
the Stockton arkose and black carbonaceous zones in lacustrine facies are radioactive but tests showed them to be low grade and not likely to yield profitable extraction; outcrops of Triassic beds are scarce except for a narrow belt along the Delaware River and their importance as uranium carriers has not been ascertained: 1005.
Uraninite Occurrences
General: autunite, carnotite, fergusonite, samarskite, torbernite, uraninite, and uranophane among uranium-bearing minerals found in state; localities unnamed; probably occur in quantities only of mineralogic interest: 975.
Uranium Exploration
Geophysical Exploration (Airborne)
Eastern Part: a considerable proportion of carbonaceous shale lying on coal mine dumps in anthracite basins is feebly radioactive; even the best of it assays no more than several thousandths of a percent U_3O_8 but this minor amount in a large dump emits sufficient radiation to be recorded as an anomaly by an airborne scintillometer: 1005.
Methods: 1101.
Mining laws: 1101.
Prospectors' guide: 1101.
Uranium Occurrences
General: autunite, carnotite, fergusonite, samarskite, torbernite, uraninite, and uranophane among uranium-bearing minerals found in state; localities unnamed; probably occur in quantities only of mineralogic interest: 975; carnotite and allanite reported in state but no commercial deposits of radium ore known: 635; carnotite in Mauch Chunk sandstone beds of Pennsylvanian age, in deposits similar to those on Colorado Plateau: 1106;

PENNSYLVANIA (contd.)

General (contd.)
Uranium Occurrences
General: cyrtolite from five unnamed localities: 834; radioactivity studies were made by U.S.G.S. on coal and associated rocks in Beaver, Clearfield, and Jefferson Counties in 1953; of 56 localities visited, six showed radioactivity significantly greater than that of coal in other localities; samples from three areas in Beaver County showed a maximum respectively of 0.007, 0.014, and 0.005% eU and 0.007, 0.016, and 0.004% U: coal from three areas in Clearfield and Jefferson Counties ranged in maximum values from 0.003-0.004% eU and contained 0.002% U; description of field and laboratory procedures used in the studies; geology; stratigraphy; structure; factors affecting radioactivity: 748; relatively high level of radioactivity in southeastern Pennsylvania and western New Jersey as compared with other areas in northeastern states and the presence of uranium minerals both at Stockton, New Jersey, and Easton, Pennsylvania, suggests that this area of the Piedmont belt and flanking sediments merit additional study as potential sources of uranium and thorium minerals; work to be undertaken by U.S.G.S: 973; uranium in black shales: 426; potential sources of new deposits of uranium may be found in the folded conglomerates and sandstones of the long ridges and valleys in eastern Pennsylvania and western New Jersey, and in similar

PENNSYLVANIA (contd.)

General (contd.)
Uranium Occurrences
General:
formations farther south, because of the presence of such deposits at Jim Thorpe (formerly Mauch Chunk), Pennsylvania, and the more recent finds in Bucks County, Pennsylvania, and Hunterdon and Mercer Counties, New Jersey: 883; the sandstone beds underlying the Coal Measures, particularly the basal Pennsylvanian and Upper Devonian, appear to be potential sources of uranium because of the high percentage of these mineralized rocks exposed in road cuts and valley walls; hundreds of miles of similar beds are buried beneath 10 to 30 ft. of overburden so that additional uranium deposits, other than those exposed by highway excavations or river erosion, probably do exist: 1005; the many abandoned iron, coal, and pyrite mines and rock quarries in the state, particularly in the coal regions, may be potential sources of uranium: 1102.
Appalachian region: one of the most promising and least prospected areas in the U.S. since the Appalachians extend from Alabama and Georgia to Quebec and uranium minerals have been found in Alabama, Kentucky, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Tennessee, and Vermont: 1093; some of the best uranium possibilities seem to lie in the long valleys of western New Jersey and eastern Pennsylvania and in the plateaus of Alabama, northern Kentucky, and Ohio: 1093.
Bibliography of U.S.G.S. Reports: 572, 1004.

PENNSYLVANIA (contd.)

General (contd.)
Uranium Occurrences
Eastern Part: autunite and torbernite in small concentrations in arkosic redbeds of the Stockton formation (Triassic) in southwest New Jersey and adjacent Pennsylvania; abnormal radioactivity without visible uranium minerals is also reported; uraniferous material occurs in distinctly limonitic lenses of light gray sandstone and pyrite is moderately abundant in one radioactive outcrop in a stream bed; limonite at other occurrences probably represents weathered iron sulphides; Lockatong argillite conformably overlies the Stockton arkose and black carbonaceous zones in lacustrine facies are radioactive but tests showed them to be low grade and not likely to yield profitable extraction; outcrops of Triassic beds are scarce except for a narrow belt along the Delaware River and their importance as uranium carriers has not been ascertained:1005; a considerable proportion of carbonaceous shale lying on coal mine dumps in anthracite basins is feebly radioactive; even the best of it assays no more than several thousandths of a percent U_3O_8 but this minor amount in a large dump emits sufficient radiation to be recorded as an anomaly by an airborne scintillometer: 1005.
Southwest Part: a total of 80 samples from 20 localities collected mainly from Freeport, Kittanning, and Pittsburgh coal beds; no field readings made were higher than 0.001% eU: 996.

PENNSYLVANIA (contd.)

General (contd.)
Uranium Occurrences
Western Part: reconnaissance radioactivity examination of 360 coal samples from 86 mines in Allegheny, Butler, Cambria, Clarion, Clearfield, Indiana, Jefferson, Lawrence, Mercer, Somerset, and Westmoreland counties; the beds sampled were the Brookfield, Lower and Upper Clarion, Lower, Middle, and Upper Kittanning, and Lower and Upper Freeport of the Allegheny series, the Bakerstown of the Conemaugh series, and the Pittsburgh and Redstone of the Monongahela series; none of the coal beds showed more than 0.002% eU; in Clearfield county a thin bone layer overlying the Upper Freeport bed showed as much as 0.040% eU but no unusual radioactivity was shown by coal immediately above the bone layer or other coals above, below, and on either side of the locality for a distance of two miles: 995; commercially important bituminous coal beds and associated rocks in the Pottsville, Allegheny, and Monongahela series of the Pennsylvanian system were examined for radioactivity with a portable scintillation counter and samples were collected at 104 localities; samples of overlying shale and underlying clay were not taken unless a radioactivity comparable to more than 0.002% eU was indicated by counter reading: coal and rock from 103 localities were almost non-radioactive and interpreted to contain essentially no uranium: 893; radioactive coal occurred only in one locality in Clearfield County where the upper 0.4 ft. of the Lower Freeport coal bed, which is 3.2 ft. thick, contained an average of 0.019% U: 893; black carbonaceous shales were also checked and a few samples collected but no abnormal radioactivity was found: 893.

PENNSYLVANIA (contd.)

General (contd.)
Uranium Occurrences
Black Shales, Uranium-bearing
General: uranium in black shales: 426.
Carbonaceous Shale, Uranium-bearing
Eastern part: a considerable proportion of carbonaceous shale lying on coal mine dumps in anthracite basins is feebly radioactive; even the best of it assays no more than several thousandths of a percent U_3O_8 but this minor amount in a large dump emits sufficient radiation to be recorded as an anomaly by an airborne scintillometer: 1005.
Coals, Uranium-bearing
General: radioactivity studies were made by U.S.G.S. on coal and associated rocks in Beaver, Clearfield, and Jefferson Counties in 1953; of 56 localities visited, six showed radioactivity significantly greater than that of coal in other localities; samples from three areas in Beaver County showed a maximum respectively of 0.007, 0.014, and 0.005% eU and 0.007, 0.016, and 0.004% U; coal from three areas in Clearfield and Jefferson Counties ranged in maximum values from 0.003-0.004% eU and contained 0.002% U; description of field and laboratory procedures used in the studies; geology; stratigraphy; structure; factors affecting radioactivity: 748.
Southwest Part: a total of 80 samples from 20 localities, collected mainly from Freeport, Kittanning, and Pittsburgh coal beds; no field readings made were higher than 0.001% eU: 996.

PENNSYLVANIA (contd.)

General (contd.)
Uranium Occurrences
Coals, Uranium-bearing
Western Part: reconnaissance radioactivity examination on 360 coal samples from 86 mines in Allegheny, Butler, Cambria, Clarion, Clearfield, Indiana, Jefferson, Lawrence, Mercer, Somerset, and Westmoreland counties; the beds sampled were the Brookfield, Lower and Upper Clarion, Lower, Middle, and Upper Kittanning, and Lower and Upper Freeport of the Allegheny series, the Bakerstown of the Conemaugh series; none of the coal beds showed more than 0.002% eU; in Clearfield county a thin bone layer overlying the Upper Freeport bed showed as much as 0.040% eU but no unusual radioactivity was shown by coal immediately above the bone layer or other coals above, below, and on either side of the locality for a distance of two miles: 995; commercially important bituminous coal beds and associated rocks in the Pottsville, Allegheny, and Monongehela series of the Pennsylvanian system were examined for radioactivity with a portable scintillation counter and samples were collected at 104 localities; samples of overlying shale and underlying clay were not taken unless a radioactivity comparable to more than 0.002% eU was indicated by counter reading; coal and rock from 103 localities were almost non-radioactive and interpreted to contain essentially no uranium: 893; radioactive coal occurred only in one locality in Clearfield County where the upper 0.4 ft. of the Lower Freeport coal bed, which is 3.2 ft. thick, contained an average of 0.019% U: 893; black carbonaceous shales were also checked and a few samples collected but no abnormal radioactivity was found: 893.

PENNSYLVANIA (contd.)

General (contd.)
Uranophane Occurrences
General: autunite, carnotite, fergusonite, samarskite, torbernite, uraninite, and uranophane among uranium-bearing minerals found in state: localities unnamed; probably occur in quantities only of mineralogic interest: 975.

Allanite Occurrences
See under individual county names and under Index III, Thorium Occurrences-Pennsylvania: 82, 249, 635, 665, 729, 762, 766, 833, 863, 865, 927, 950, 964, 975, 1018, 1089, 1098, 1105.

Allegheny County
Radioactive Coal
Carnegie quadrangle
Jeff Mining Co. drift mine in E edge of Rosevale: radioactivity of Pittsburgh coal with small shale partings above the base and found between shale and clay, less than 0.001% eU:893.
New Kensington Quadrangle
Eden Coal Co. strip mine at Culmerville: radioactivity of Lower Freeport coal in three coals separated by shale, all less than 0.001% eU: 893.
Pittsburgh quadrangle
Bucar Coal Co. strip mine, 3½ mi. W of Clairton: radioactivity of Pittsburgh coal between shale and pyrite, less than 0.001% eU: 893.

Andersonite Occurrences
See under individual county names and under Index III, Andersonite Occurrences-Pennsylvania: 867.

Argillite, Uranium-bearing
See under individual county names and under Index III, Argillite, Uranium-bearing-Pennsylvania: 995, 996.

PENNSYLVANIA (contd.)

Armstrong County
Radioactive Coal
Kittanning quadrangle
Hepfelfinger Coal Co. strip mine at Cowansville: radioactivity of Lower Freeport coal between siltstone and dark-gray, carbonaceous shale, less than 0.001% eU: 893.
M. & E. Coal Co. strip mine on right bank of Allegheny River, 1 mi. N. of Kittanning: radioactivity of Lower Kittanning coal between mudstone and clay, less than 0.001% eU: 893.
Rural Valley quadrangle
Harold Brewer's strip mine, 1.3 mi. S of Slabtown: radioactivity of Upper Kittanning coal between mudstone and siltstone, less than 0.001% eU: 893.
Iseman Coal Co. strip mine on hill ¼ mi. S of New Bethlehem: radioactivity of Upper Freeport coal in a cannel coal and a coal with thin partings of bony coal, separated by interbedded coal and shale, both less than 0.001% eU: 893; radioactivity of Lower Freeport coal between shale and clay, less than 0.001% eU: 893.
Iseman Coal Co. strip mine, 1 mi. E of South Bethlehem: radioactivity of Middle Kittanning coal in two coals separated by gray pyritic siltstone, both less than 0.001% eU: 893.
M. & E. Coal Co. strip mine on Pennsylvania Highway 85, 4½ mi. E of Kittanning: radioactivity of Upper Freeport coal between siltstone and clay, less than 0.001% eU: 893.

PENNSYLVANIA (contd.)

Autunite Occurrences
Pennsylvania-Autunite Occurrences:
See under individual county names and under Index III, Autunite Occurrences-Pennsylvania: 665, 669, 757, 759, 761, 762, 766, 770, 817, 861, 873, 908, 909, 973, 975, 983, 1005, 1013, 1018, 1042.

Beaver County
Clay, Uranium-bearing
Newcastle quadrangle
Darlington area
Active strip pit 0.2 mi. S of old Pennsylvania Highway 51 and 1.7 mi. S of Darlington: radioactivity of coal and clay from Lower Freeport coal, starting with upper layer: top 11 in. of coal, no scintillometer reading, 41 counts/minute less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; bottom 9 in. of coal, no scintillometer reading, 57 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; four samples of top 3 in. of underclay studied with counts/minute value being average of four sub-samples in each case and no scintillometer readings taken: first sample 228 counts/minute 0.005% eU found by conversion from assay cup-Geiger counter measurement and 0.004% eU in two radioactivity measurements in the laboratory; 0.004% eU in sample and 0.005% U in ash; second, 175 counts/minute, 0.004% eU found by conversion from assay cup-Geiger counter measurement and 0.003% eU in two radioactivity

PENNSYLVANIA (contd.)

Beaver County (contd.)
Clay, Uranium-bearing
Newcastle quadrangle
Darlington area
Active strip:
measurements in the laboratory, 0.004% U in sample and 0.004% U in ash; third, 222 counts/minute, 0.005% eU found by conversion from assay cup-Geiger counter measurements and 0.004% eU in two radioactivity measurements in laboratory; fourth, 179 counts/minute, 0.004% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in laboratory: 748.
New roadcut on S side of new Pennsylvania Highway 51, 0.95 mi. SE of bridge where it crosses old Pennsylvania Highway 51: radioactivity of coal and clay in Lower Freeport coal, starting with upper layer: bottom 3 in. of coal, 0.048 mr/hr, 284 counts/minute, 0.007% eU found by conversion from assay cup-Geiger counter measurement and 0.004 and 0.005% eU by radioactivity measurement in the laboratory, 0.007% U in sample and 0.041% U in ash; top 2 in. of underclay, 0.060 mr/hr, 307 counts/minute, 0.007% eU found by conversion from assay cup-Geiger counter measurement and 0.006 and 0.008% eU by radioactivity measurement in the laboratory, 0.005% U in sample and 0.006% U in ash; top 4.5 in. of underclay, 0.060 mr/hr, 235 counts/minute, 0.005% eU found by conversion from assay cup-Geiger counter measurement, and 0.004 and 0.005% eU by radioactivity measurement

PENNSYLVANIA (contd.)

Beaver County (contd.)
Clay, Uranium-bearing
Newcastle quadrangle
Darlington area
New roadcut on S side of new Pennsylvania Highway 51: in the laboratory, 0.004% U in sample and 0.004% U in ash; bottom 4.5 in. of underclay, 0.040 mr/hr, 195 counts/minute, 0.004% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.
Prospect pit in new roadcut on N side of new Pennsylvania Highway 51, 0.95 mi. SE of bridge where it crosses old Pennsylvania Highway 51: radioactivity of coal and clay in Lower Freeport coal, starting with upper layer: top 12 in. of coal, 0.012 mr/hr, 33 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; middle 6 in. of coal, 0.032 mr/hr, 38 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; bottom 6 in. of coal, 0.080 mr/hr, 313 counts/minute, 0.007% eU found by conversion from assay cup-Geiger counter measurement and 0.007 and 0.010% eU by radioactivity measurement in the laboratory; 0.010%U in sample and 0.060% U in ash; bottom 3 in. of coal, 0.100 mr/hr, 450 counts/minute, 0.011% eU found by conversion from assay cup-Geiger counter measurement; no other measurement made; top 3 in. of underclay, 0.115 mr/hr, 549 counts/

PENNSYLVANIA (contd.)

Beaver County (contd.)
Clay, Uranium-bearing
Newcastle quadrangle
Darlington area
Prospect pit:
minute, 0.014% eU found by conversion from assay cup-Geiger counter measurement and 0.011% eU in two radioactivity measurements in the laboratory, 0.016% U in sample and 0.026% U in ash; top 1.5 in. of underclay, 0.080 mr/hr, 360 counts/minute, 0.009% eU found by conversion from assay cup-Geiger counter measurement, no other measurements made; underclay, 5 in. below top, 0.060 mr/hr, 198 counts/minute, 0.004% eU found by conversion from assay cup-Geiger counter measurement, no other measurements made: 748.

Coal, Uranium-bearing
Newcastle quadrangle
Darlington area
New roadcut on S side of new Pennsylvania Highway 51, 0.95 mi. SE of bridge where it crosses old Pennsylvania Highway 51: radioactivity of coal and clay in Lower Freeport coal, starting with upper layer: bottom 3 in. of coal, 0.048 mr/hr, 284 counts/minute, 0.007% eU found by conversion from assay cup-Geiger counter measurement and 0.004 and 0.005% eU by radioactivity measurement in the laboratory, 0.007% U in sample and 0.041% U in ash; top 2 in. of underclay, 0.060 mr/hr, 307 counts/minute, 0.007% eU found by conversion from assay cup-Geiger counter measurement and 0.006 and 0.008% eU by radioactivity measurement in the laboratory, 0.005% U in

PENNSYLVANIA (contd.)

Beaver County (contd.)
Coal, Uranium-bearing
Newcastle quadrangle
Darlington area
New roadcut on S side of new Pennsylvania Highway 51: sample and 0.006% U in ash; top 4.5 in. of underclay, 0.060 mr/hr, 235 counts/minute, 0.005% eU found by conversion from assay cup-Geiger counter measurement, and 0.004 and 0.005% eU by radioactivity measurement in the laboratory, 0.004% U in sample and 0.004% U in ash; bottom 4.5 in. of underclay, 0.040 mr/hr, 195 counts/minute, 0.004% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.
Prospect pit in new roadcut on N side of new Pennsylvania Highway 51, 0.95 mi. SE of bridge where it crosses old Pennsylvania Highway 51: radioactivity of coal and clay in Lower Freeport coal, starting with upper layer, top 12 in. of coal, 0.012 mr/hr, 33 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; middle 6 in. of coal, 0.032 mr/hr, 38 counts/minute less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; bottom 6 in. of coal, 0.080 mr/hr, 313 counts/minute, 0.007% eU found by conversion from assay cup-Geiger counter measurement and 0.007 and 0.010% eU by radioactivity measurement in the laboratory, 0.010% U in sample

PENNSYLVANIA (contd.)

Beaver County (contd.)
Coal, Uranium-bearing
Newcastle quadrangle
Darlington area
Prospect pit:
and 0.060% U in ash; bottom 3 in. of coal, 0.100 mr/hr., 450 counts/minute, 0.011% eU found by conversion from assay cup-Geiger counter measurement; no other measurement made; top 3 in. of underclay, 0.115 mr/hr., 549 counts/minute, 0.014% eU found by conversion from assay cup-Geiger counter measurement and 0.011% eU in two radioactivity measurements in the laboratory, 0.016% U in sample and 0.026% U in ash; top 1.5 in. of underclay, 0.080 mr/hr., 360 counts/minute, 0.009% eU found by conversion from assay cup-Geiger counter measurement, no other measurements made; underclay, 5 in. below top, 0.060 mr/hr., 198 counts/minute, 0.004% eU found by conversion from assay cup-Geiger counter measurement, no other measurements made: 748.

Radioactive Clay
Newcastle quadrangle
Darlington area
Active strip pit 0.2 mi. S of old Pennsylvania Highway 51 and 1.7 mi. S of Darlington: radioactivity of coal and clay from Lower Freeport coal, starting with upper layer: top 11 in. of coal, no scintillometer reading, 41 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; bottom 9 in. of

PENNSYLVANIA (contd.)

Beaver County (contd.)
Radioactive Clay
Newcastle quadrangle
Darlington area
Active strip pit:
coal, no scintillometer reading, 57 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; four samples of top 3 in. of underclay studied with counts/minute value being average of four sub-samples in each case and no scintillometer readings taken: first sample, 228 counts/minute, 0.005% eU found by conversion from assay cup-Geiger counter measurement and 0.004% eU in two radioactivity measurements in the laboratory; 0.004% U in sample and 0.005% U in ash; second, 175 counts/minute, 0.004% eU found by conversion from assay cup-Geiger counter measurement and 0.003% eU in two radioactivity measurements in the laboratory, 0.004% U in sample and 0.004% U in ash; third, 222 counts/minute, 0.005% eU found by conversion from assay cup-Geiger counter measurement and 0.004% eU in two radioactivity measurements in the laboratory; fourth, 179 counts/minute, 0.004% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.

PENNSYLVANIA (contd.)

Beaver County (contd.)
Radioactive Clay
Newcastle quadrangle
Darlington area
New roadcut on S side of new Pennsylvania Highway 51, 0.95 mi. SE of bridge where it crosses old Pennsylvania Highway 51: radioactivity of coal and clay in Lower Freeport coal, starting with upper layer: bottom 3 in. of coal, 0.048 mr/hr, 284 counts/minute, 0.007% eU found by conversion from assay cup-Geiger counter measurement and 0.004 and 0.005% eU by radioactivity measurement in the laboratory, 0.007% U in sample and 0.041% U in ash; top 2 in. of underclay, 0.060 mr/hr, 307 counts/minute, 0.007% eU found by conversion from assay cup-Geiger counter measurement and 0.006 and 0.008% eU by radioactivity measurement in the laboratory; 0.005% U in sample and 0.006% U in ash; top 4.5 in. of underclay, 0.060 mr/hr, 235 counts/minute, 0.005% eU found by conversion from assay cup-Geiger counter measurement, and 0.004 and 0.005% eU by radioactivity measurement in the laboratory, 0.004% U in sample and 0.004% U in ash; bottom 4.5 in. of underclay, 0.040 mr/hr, 195 counts/minute, 0.004% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.

PENNSYLVANIA (contd.)

Beaver County (contd.)
Radioactive Clay
Newcastle quadrangle
Darlington area
Prospect pit in new roadcut on N side of new Pennsylvania Highway 51, 0.95 mi. SE of bridge where it crosses old Pennsylvania Highway 51: radioactivity of coal and clay in Lower Freeport coal, starting with upper layer: top 12 in. of coal, 0.012 mr/hr, 33 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; middle 6 in. of coal, 0.032 mr/hr, 38 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; bottom 6 in. of coal, 0.080 mr/hr, 313 counts/minute, 0.007% eU found by conversion from assay cup-Geiger counter measurement and 0.007 and 0.010% eU by radioactivity measurement in the laboratory, 0.010% U in sample and 0.060% U in ash; bottom 3 in. of coal, 0.100 mr/hr, 450 counts/minute, 0.011% eU found by conversion from assay cup-Geiger counter measurement; no other measurement made; top 3 in. of underclay, 0.115 mr/hr, 549 counts/minute, 0.014% eU found by conversion from assay cup-Geiger counter measurement and 0.011% eU in two radioactivity measurements in the laboratory, 0.016% U in sample and 0.026% U in ash; top 1.5 in. of underclay, 0.080 mr/hr, 360 counts/minute,

PENNSYLVANIA (contd.)

Beaver County (contd.)
Radioactive Clay
Newcastle quadrangle
Darlington area
Prospect pit:
0.009% eU found by conversion from assay cup-Geiger counter measurement, no other measurements made; underclay, 5 in. Below top, 0.060 mr/hr., 198 counts/minute, 0.004% eU found by conversion from assay cup-Geiger counter measurement, no other measurements made: 748.
Radioactive Coal
Newcastle quadrangle
Cannelton, diamond drill cores from N side of railroad, 0.4 mi. E of: radioactivity of two cores of Lower Kittanning coal, no scintillometer readings made, 42 and 41 counts/minute, and less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.
Darlington area
Active strip pit 0.2 mi. S of old Pennsylvania Highway 51 and 1.7 mi. S of Darlington: radioactivity of coal and clay from Lower Freeport coal, starting with upper layer: top 11 in. of coal, no scintillometer reading, 41 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; bottom 9 in. of coal, no scintillometer reading,

PENNSYLVANIA (contd.)

Beaver County (contd.)
Radioactive Coal
Newcastle quadrangle
Darlington area
Active strip:
57 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; four samples of top 3 in. of underclay studied, with counts/minute value being average of four sub-samples in each case and no scintillometer readings taken: first sample, 228 counts/minute, 0.005% eU found by conversion from assay cup-Geiger counter measurement and 0.004% eU in two radioactivity measurements in the laboratory; 0.004% U in sample and 0.005% U in ash; second, 175 counts/minute, 0.004% eU found by conversion from assay cup-Geiger counter measurement and 0.003% eU in two radioactivity measurements in the laboratory, 0.004% U in sample and 0.004% U in ash; third, 222 counts/minute, 0.005% eU found by conversion from assay cup-Geiger counter measurement and 0.004% eU in two radioactivity measurements in the laboratory; fourth, 179 counts/minute, 0.004% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.

PENNSYLVANIA (contd.)

Beaver County (contd.)
Radioactive Coal
Newcastle quadrangle
Darlington area
Diamond drill cores from 1.8 mi. SW of Darlington: radioactivity of 15 cores of Lower Kittanning coal: no scintillometer readings made, 29-52 counts/minute, and less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.
New roadcut on N side of new Pennsylvania Highway 51, 0.1 mi. SE of bridge where it crosses old Pennsylvania Highway 51: radioactivity of Middle Kittanning coal, 0.010 mr/hr, 43 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurements and by radioactivity measurement in the laboratory: 748.
New roadcut on S side of new Pennsylvania Highway 51, 0.95 mi. SE of bridge where it crosses old Pennsylvania Highway 51: radioactivity of coal and clay in Lower Freeport coal, starting with upper layer: bottom 3 in. of coal, 0.048 mr/hr, 284 counts/minute, 0.007% eU found by conversion from assay cup-Geiger counter measurement and 0.004 and 0.005% eU by radioactivity measurement in the laboratory, 0.007% U in sample and 0.041% U in ash; top 2 in. of underclay, 0.060 mr/hr, 307 counts/minute, 0.007% eU found by conversion from assay cup-Geiger

PENNSYLVANIA (contd.)

Beaver County (contd.)
Radioactive Coal
Newcastle quadrangle
Darlington area
New roadcut on S side of new Pennsylvania Highway 51: counter measurement and 0.006 and 0.008% eU by radioactivity measurement in the laboratory, 0.005% U in sample and 0.006% U in ash; top 4.5 in. of underclay, 0.060 mr/hr, 235 counts/minute, 0.005% eU found by conversion from assay cup-Geiger counter measurement and 0.004 and 0.005% eU by radioactivity measurement in the laboratory, 0.004% U in sample and 0.004% U in ash; bottom 4.5 in. of underclay, 0.040 mr/hr, 195 counts/minute, 0.004% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.
Old strip pit on S side of new Pennsylvania Highway 51, 1.2 mi. SE of bridge where it crosses old Pennsylvania Highway 51: radioactivity of Upper Freeport coal: top 28 in. of coal, 0.014 mr/hr, 37 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; middle 28 in. of coal, 0.014 mr/hr, 36 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurements and by radioactivity measurements in the laboratory; bottom 14 in. of coal, 0.018 mr/hr, 55 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.

PENNSYLVANIA (contd.)

Beaver County (contd.)
Radioactive Coal
Newcastle quadrangle
Darlington area
Prospect pit in new roadcut on N side of new Pennsylvania Highway 51, 0.95 mi. SE of bridge where it crosses old Pennsylvania Highway 51: radioactivity of coal and clay in Lower Freeport coal, starting with upper layer: top 12 in. of coal, 0.012 mr/hr, 33 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; middle 6 in. of coal, 0.032 mr/hr, 38 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; bottom 6 in. of coal, 0.080 mr/hr, 313 counts/minute, 0.007% eU found by conversion from assay cup-Geiger counter measurement and 0.007 and 0.010% eU by radioactivity measurement in the laboratory, 0.010% U in sample and 0.060% U in ash; bottom 3 in. of coal, 0.100 mr/hr, 450 counts/minute, 0.011% eU found by conversion from assay cup-Geiger counter measurement; no other measurement made; top 3 in. of underclay, 0.115 mr/hr, 549 counts/minute, 0.014% eU found by conversion from assay cup-Geiger counter measurement and 0.011% eU in two radioactivity measurements in the laboratory, 0.016% U in sample and 0.026% U in

PENNSYLVANIA (contd.)

Beaver County (contd.)
Radioactive Coal
Newcastle quadrangle
Darlington area
Prospect pit: ash; top 1.5 in. of underclay, 0.080 mr/hr, 360 counts/minute, 0.009% eU found by conversion from assay cup-Geiger counter measurement, no other measurements made; underclay, 5 in. below top, 0.060 mr/hr, 198 counts/minute, 0.004% eU found by conversion from assay cup-Geiger counter measurement, no other measurements made: 748.
Roadcut 1.5 mi. SE of Darlington: radioactivity of two samples of Lower Freeport coal and its underclay 0.005% eU for first and 0.006% eU for second: 994.
Roadcut 2.0 mi. SW of Darlington: radioactivity of two samples of Lower Freeport coal and its underclay, 0.005% eU for first and 0.004% eU for second: 994.
Strip mine in Darlington area: radioactivity of two samples of Lower Freeport coal and its underclay, 0.010% eU for first and 0.006% eU for second: 994.
Homewood, old railroad cut on S side of tracks, 2.5 mi. W of: radioactivity of Lower Freeport coal, 0.014 mr/hr, 44[illegible] counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurements and by radioactivity measurement in the laboratory: 748.

PENNSYLVANIA (contd.)

Beaver County (contd.)
Radioactive Rocks
Beaver quadrangle
Old roadcut on N side of Pennsylvania Highway 168, 0.3 mi. NW of junction with Pennsylvania Highway 68 at Midland: radioactivity of Brush Creek dark shale, 0.030 mr/hr, 140 counts/minute, 0.003% eU found by conversion from assay cup-Geiger counter measurement, no other measurement made: 748.
Newcastle quadrangle
Darlington area
New roadcut on S side of new Pennsylvania Highway 51, 1.8 mi. SE of bridge where it crosses old Pennsylvania Highway 51: radioactivity of Brush Creek dark shale, 0.030 mr/hr, 150 counts/minute, 0.003% eU found by conversion from assay cup-Geiger counter measurement and 0.004 and 0.003% eU by radioactivity measurements in the laboratory: 748.
Uranium Occurrences
Newcastle quadrangle
Darlington area
Active strip pit 0.2 mi. S of old Pennsylvania Highway 51 and 1.7 mi. S of Darlington: radioactivity of coal and clay from Lower Freeport coal, starting with upper layer: top 11 in. of coal, no scintillometer reading, 41 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; bottom 9 in. of coal, no scintillometer reading, 57 counts/minute, less than 0.001% eU found by conversion from

PENNSYLVANIA (contd.)

Beaver County (contd.)
Uranium Occurrences
Newcastle quadrangle
Darlington area
Active pit:
assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; four samples of top 3 in. of underclay studied with counts/minute value being average of four sub-samples in each case and no scintillometer readings taken: first sample, 228 counts/minute, 0.005% eU found by conversion from assay cup-Geiger counter measurement and 0.004% eU in two radioactivity measurements in the laboratory; 0.004% U in sample and 0.005% U in ash; second, 175 counts/minute, 0.004% eU found by conversion from assay cup-Geiger counter measurements and 0.003% eU in two radioactivity measurements in the laboratory, 0.004% U in sample and 0.004% U in ash; third, 222 counts/minute, 0.005% eU found by conversion from assay cup-Geiger counter measurement and 0.004% eU in two radioactivity measurements in the laboratory; fourth, 179 counts/minute, 0.004% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.

PENNSYLVANIA (contd.)

Beaver County (contd.)
Uranium Occurrences
Newcastle quadrangle
Darlington area
New roadcut on S side of new Pennsylvania Highway 51, 0.95 mi. SE of bridge where it crosses old Pennsylvania Highway 51: radioactivity of coal and clay in Lower Freeport coal, starting with upper layer: bottom 3 in. of coal 0.048 mr/hr, 284 counts/minute, 0.007% eU found by conversion from assay cup-Geiger counter measurements and 0.004 and 0.005% eU by radioactivity measurement in the laboratory, 0.007% U in sample and 0.041% U in ash; top 2 in. of underclay, 0.060 mr/hr, 307 counts/minute, 0.007% eU found by conversion from assay cup-Geiger counter measurement and 0.006 and 0.008% eU by radioactivity measurement in the laboratory, 0.005% U in sample and 0.006% U in ash; top 4.5 in. of underclay, 0.060 mr/hr, 235 counts/minute, 0.005% eU found by conversion from assay cup-Geiger counter measurement and 0.004 and 0.005% eU by radioactivity measurement in the laboratory, 0.004% U in sample and 0.004% U is ash; bottom 4.5 in. of underclay, 0.040 mr/hr, 195 counts/minute, 0.004% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.

PENNSYLVANIA (contd.)

Beaver County (contd.)
Uranium Occurrences
Newcastle quadrangle
Darlington area
Prospect pit in new roadcut on N side of new Pennsylvania Highway 51, 0.95 miles SE of bridge where it crosses old Pennsylvania Highway 51: radioactivity of coal and clay in Lower Freeport coal, starting with upper layer: top 12 in. of coal, 0.012 mr/hr, 33 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; middle 6 in. of coal, 0.032 mr/hr, 38 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; bottom 6 in. of coal, 0.080 mr/hr, 313 counts/minute, 0.007% eU found by conversion from assay cup-Geiger counter measurement and 0.007 and 0.010% eU by radioactivity measurement in the laboratory, 0.010% U in sample and 0.060% U in ash; bottom 3 in. of coal, 0.100 mr/hr, 450 counts/minute, 0.011% eU found by conversion from assay cup-Geiger counter measurement, no other measurement made; top 3 in. of underclay, 0.115 mr/hr, 549 counts/minute, 0.014% eU found by conversion from assay cup-Geiger counter measurement and 0.011% eU in two radioactivity measurements in the laboratory, 0.016% U in sample and 0.026% U in ash; top 1.5 in. of underclay, 0.080 mr/hr, 360 counts/minute, 0.009% eU found by conversion from assay cup-Geiger counter measurement, no other measurements made; underclay, 5 in. below top, 0.060

PENNSYLVANIA (contd.)

Beaver County (contd.)
Uranium Occurrences
Newcastle quadrangle
Darlington area
Prospect pit:
mr/hr, 198 counts/minute, 0.004% eU found by conversion from assay cup-Geiger counter measurement, no other measurements made: 748.
Clay, Uranium-bearing
Newcastle quadrangle
Darlington area
Active strip pit 0.2 mi. S of old Pennsylvania Highway 51 and 1.7 mi. S of Darlington: radioactivity of coal and clay from Lower Freeport coal, starting with upper layer: top 11 in. of coal, no scintillometer reading, 41 counts/minute less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; bottom 9 in. of coal, no scintillometer reading, 57 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; four samples of top 3 in. of underclay studied with counts/minute value being average of four subsamples in each case and no scintillometer readings taken: first sample, 228 counts/minute, 0.005% eU found by conversion from assay cup-Geiger counter measurement and 0.004% eU in two radioactivity measurements in the laboratory; 0.004% U in sample

PENNSYLVANIA (contd.)

Beaver County (contd.)
Uranium Occurrences
Clay, Uranium-bearing
Newcastle quadrangle
Darlington area
Active strip:
and 0.005% U in ash; second, 175 counts/minute, 0.004% eU found by conversion from assay cup-Geiger counter measurement and 0.003% eU in two radioactivity measurements in the laboratory, 0.004% U in sample and 0.004% U in ash; third, 222 counts/minute, 0.005% eU found by conversion from assay cup-Geiger counter measurement and 0.004% eU in two radioactivity measurements in the laboratory; fourth, 179 counts/minute, 0.004% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.
New roadcut on S side of new Pennsylvania Highway 51, 0.95 mi. SE of bridge where it crosses old Pennsylvania Highway 51: radioactivity of coal and clay in Lower Freeport coal, starting with upper layer: bottom 3 in. of coal, 0.048 mr/hr, 284 counts/minute, 0.007% eU found by conversion from assay cup-Geiger counter measurement and 0.004 and 0.005% eU by radioactivity measurement in the laboratory, 0.007% U in sample and 0.041% U in ash; top 2 in. of underclay, 0.060 mr/hr, 307 counts/minute, 0.007% eU found by conversion from assay cup-Geiger counter measurement and 0.006 and 0.008% eU by radioactivity measurement in the laboratory;

PENNSYLVANIA (contd.)

Beaver County (contd.)
Uranium Occurrences
Clay, Uranium-bearing
Newcastle quadrangle
Darlington area
New roadcut on S side of new Pennsylvania Highway 51: 0.005% U in sample and 0.006% U in ash; top 4.5 in. of underclay, 0.060 mr/hr, 235 counts/minute, 0.005% eU found by conversion from assay cup-Geiger counter measurement and 0.004 and 0.005% eU by radioactivity measurement in the laboratory, 0.004% U in sample and 0.004% U in ash; bottom 4.5 in. of underclay, 0.040 mr/hr, 195 counts/minute, 0.004% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurements in the laboratory: 748.
Prospect pit in new roadcut on N side of new Pennsylvania Highway 51, 0.95 mi. SE of bridge where it crosses old Pennsylvania Highway 51: radioactivity of coal and clay in Lower Freeport coal, starting with upper layer: top 12 in. of coal, 0.012 mr/hr, 33 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; middle 6 in. of coal, 0.032 mr/hr, 38 counts/minute, less than 0.001% eU found by conversion

PENNSYLVANIA (contd.)

Beaver County (contd.)
Uranium Occurrences
Clay, Uranium-bearing
Newcastle quadrangle
Darlington area
Prospect pit:
from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; bottom 6 in. of coal, 0.080 mr/hr, 313 counts/minute, 0.007% eU found by conversion from assay cup-Geiger counter measurement and 0.007 and 0.010% eU by radioactivity measurement in the laboratory, 0.010% U in sample and 0.060% U in ash; bottom 3 in. of coal, 0.100 mr/hr, 450 counts/minute, 0.011% eU found by conversion from assay cup-Geiger counter measurement; no other measurement made; top 3 in. of underclay; 0.115 mr/hr, 549 counts/minute, 0.014% eU found by conversion from assay cup-Geiger counter measurement and 0.011% eU in two radioactivity measurements in the laboratory, 0.016% U in sample and 0.026% U in ash; top 1.5 in. of underclay, 0.080 mr/hr, 360 counts/minute, 0.009% eU found by conversion from assay cup-Geiger counter measurement, no other measurement made; underclay 5 in. below top, 0.060 mr/hr, 198 counts/minute, 0.004% eU found by conversion from assay cup-Geiger counter measurement, no other measurements made: 748.

PENNSYLVANIA (contd.)

Beaver County (contd.)
Uranium Occurrences
Coal, Uranium-bearing
Newcastle quadrangle
Darlington area
New roadcut on S side of new Pennsylvania Highway 51, 0.95 mi. SE of bridge where it crosses old Pennsylvania Highway 51: radioactivity of coal and clay in Lower Freeport coal, starting with upper layer; bottom 3 in. of coal, 0.048 mr/hr, 284 counts/minute, 0.007% eU found by conversion from assay cup-Geiger counter measurement and 0.004 and 0.005% eU by radioactivity measurement in the laboratory, 0.007% U in sample and 0.041% U in ash; top 2 in. of underclay, 0.060 mr/hr, 307 counts/minute, 0.007% eU found by conversion from assay cup-Geiger counter measurement and 0.006 and 0.008% eU by radioactivity measurement in the laboratory, 0.005% U in sample and 0.006% U in ash; top 4.5 in. of underclay, 0.060 mr/hr, 235 counts/minute, 0.005% eU found by conversion from assay cup-Geiger counter measurement, and 0.004 and 0.005% eU by radioactivity measurement in the laboratory, 0.004% U in sample and 0.004% U in ash; bottom 4.5 in. of underclay, 0.040 mr/hr, 195 counts/minute, 0.004% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.

PENNSYLVANIA (contd.)

Beaver County (contd.)
Uranium Occurrences
Coal, Uranium-bearing
Newcastle quadrangle
Darlington area
Prospect pit in new roadcut on N side of new Pennsylvania Highway 51, 0.95 mi. SE of bridge where it crosses old Pennsylvania Highway 51: radioactivity of coal and clay in Lower Freeport coal, starting with upper layer: top 12 in. of coal, 0.012 mr/hr, 33 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurements and by radioactivity measurement in the laboratory; middle 6 in. of coal, 0.032 mr/hr, 38 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; bottom 6 in. of coal, 0.080 mr/hr, 313 counts/minute, 0.007% eU found by conversion from assay cup-Geiger counter measurement and 0.007 and 0.010% eU by radioactivity measurement in the laboratory, 0.010% U in sample and 0.060% U in ash; bottom 3 in. of coal, 0.100 mr/hr, 450 counts/minute, 0.011% eU found by conversion from assay cup-Geiger counter measurement; no other measurement made; top 3 in. of underclay, 0.115 mr/hr, 549 counts/minute, 0.014% eU found by conversion from assay cup-Geiger counter measurement and 0.011% eU in two radioactivity measurements in the laboratory,

PENNSYLVANIA (contd.)

Beaver County (contd.)
Uranium Occurrences
Coal, Uranium-bearing
Newcastle quadrangle
Darlington area
Prospect pit:
0.016% U in sample and 0.026% U in ash; top 1.5 in. of underclay, 0.080 mr/hr, 360 counts/minute, 0.009% eU found by conversion from assay cup-Geiger counter measurement, no other measurements made; underclay, 5 in. below top, 0.060 mr/hr, 198 counts/minute, 0.004% eU found by conversion from assay cup-Geiger counter measurement, no other measurements made: 748.

Bedford County
Radioactive Coal
Broad Top quadrangle
McIntyre Coal Co. drift mine, ½ mi. S of Finleyville: radioactivity of Kelley coal, a correlative of Upper Freeport coal, in two coals separated by claystone, both less than 0.001% eU: 893.
Rockhill Coal Co. strip mine at Finleyville: radioactivity of Speer coal, a correlative of Mahoning coal, between two gray shales, less than 0.001% eU: 893.
Rockhill Coal Co. strip mine, 1 mi. W of Alvan: radioactivity of Upper Freeport coal between shale and clay, less than 0.001% eU: 893.
Rockhill Coal Co. strip mine, 1 mi. S of Alvan: radioactivity of Barnett coal, a correlative of Lower Kittanning coal, in two coals separated by siltstone, both less than 0.001% eU: 893.

PENNSYLVANIA (contd.)

Berks County
Allanite Occurrences
Alsace Township
Pricetown and Trexler mica mine: allanite: 975.
Trexler Mica Mine NE of McKnight's Gap: allanite in large masses, autunite, torbernite, zircon: 766.
Pike Township
Farm of Jonathon Rohrbach near Lobachville in Oley Valley: old iron ore pit showing radioactivity but source not indicated; possibly allanite may be present in Precambrian granite gneiss: 1089.
Pricetown: radioactive minerals present and, when given, intensity of radiograph on photographic plate: allanite in lumps: 1018.
Pricetown:
Eckhart's Furnace, ENE of Reading: allanite associated with magnetite and zircon: 762.
Ruscombmanor Township
Farms near Pricetown in Ruscombmanor Township: massive allanite with zircon and magnetite, and often coated with brownish decomposition product: 766.
Haines' farm: allanite associated with magnetite and zircon: 729.
Rhoades' farm: allanite associated with magnetite and zircon: 729.
Schroeder's farm: allanite associated with magnetite and zircon: 729.
Reading: allanite: 635; allanite as a gangue of zircon: 964.
Autunite Occurrences
Alsace Township
Trexler Mica Mine NE of McKnight's Gap: allanite in large masses, autunite, torbernite, zircon: 766.

PENNSYLVANIA (contd.)

Berks County (contd.)
Magnetite, Thorium-bearing
Boyertown: Triassic magnetite ore, fine-grained magnetite with greenish gangue, associated with late Triassic diabase and of Palisade age, activity 17.6 x 10^{-6} cc. He/g. 27.8 x 10^{-14} g. Ra/g., 1.32 x 10^{-7} g. Th/g., and age ratio, 133 m.y.: 786.
Radioactive Iron Deposits
Farm of Jonathon Rohrbach near Lobachville in Oley Valley in Pike Township: old iron ore pit showing radioactivity but source not indicated; possibly allanite may be present in Precambrian granite gneiss: 1089.
Radioactive Magnetite
Boyertown: Triassic magnetite ore, fine-grained magnetite with greenish gangue, associated with late Triassic diabase and of Palisade age, activity 17.6 x 10^{-6} cc. He/g., 27.8 x 10^{-14} g. Ra/g., 1.32 x 10^{-7} g. Th/g., and age ratio, 133 m.y.: 786.
Thorium Occurrences
Alsace Township
Pricetown and Trexler mica mine: allanite: 975.
Trexler Mica Mine NE of McKnight's Gap: allanite in large masses, autunite, torbernite, zircon: 766.
Boyertown: Triassic magnetite ore, fine-grained magnetite with greenish gangue, associated with late Triassic diabase and of Palisade age, activity 17.6 x 10^{-6} cc. He/g., 27.8 x 10^{-14} g. Ra/g., 1.32 x 10^{-7} g. Th/g., and age ratio, 133 m.y.: 786.

PENNSYLVANIA (contd.)

Berks County (contd.)
Thorium Occurrences
Pike Township
Farm of Jonathon Rohrbach near Lobachville in Oley Valley: old iron ore pit showing radioactivity but source not indicated; possibly allanite may be present in Precambrian granite gneiss: 1089.
Pricetown: radioactive minerals present and, when given, intensity of radiograph on photographic plate: allanite in lumps: 1018.
Pricetown
Eckhart's Furnace, ENE of Reading: allanite associated with magnetite and zircon: 762.
Ruscombmanor Township
Farms near Pricetown in Ruscombmanor Township: massive allanite with zircon and magnetite, and often coated with brownish decomposition product: 766
Haines' farm: allanite associated with magnetite and zircon: 729.
Rhoades' farm: allanite associated with magnetite and zircon: 729.
Schroeder's farm: allanite associated with magnetite and zircon: 729.
Reading: allanite: 635; allanite as a gangue of zircon: 964.
Magnetite, Thorium-bearing
Boyertown: Triassic magnetite ore, fine-grained magnetite with greenish gangue, associated with late Triassic diabase and of Palisade age, activity 17.6 x 10^{-6} cc. He/g., 27.8 x 10^{-14} g. Ra/g., 1.32 x 10^{-7} g. Th/g., and age ratio, 133 m.y.: 786.

PENNSYLVANIA (contd.)

Berks County (contd.)
Torbernite Occurrence
Alsace Township
Trexler Mica Mine NE of McKnight's Gap: allanite in large masses, autunite, torbernite, zircon: 766.
Uranium Occurrences
Alsace Township
Trexler Mica Mine NE of McKnight's Gap: allanite in large masses, autunite, torbernite, zircon: 766.

Beta-Uranotile Occurrences
See under individual county names and under Index III, Beta-Uranotile Occurrences-Pennsylvania: 757.

Bibliographies
Uranium Occurrences
Bibliography of U.S.G.S. reports: 572; 1004.

Black Shales, Uranium-bearing
See under individual county names and under Index III, Black Shales, Uranium-bearing-Pennsylvania:426.

Blair County
Radioactive Coal
Ebensburg quadrangle
Burkhart Coal & Lumber Co. strip mine, 1 mi. SE of Gallitzin: radioactivity of Upper Freeport coal, of which lower 0.3 ft. is dull, sparse vitrain, less than 0.001% eU: 893.

PENNSYLVANIA (contd.)

Bucks County
Argillite, Uranium-bearing
General: ten occurrences of uranium-bearing argillite in the Lockatong formation and three occurrences of uranium-bearing sandstone in the Stockton formation, both of Triassic age, in Bucks County, Pennsylvania, and in Hunterdon County, New Jersey; argillite contains as much as 0.05% U but usually from 0.01 to 0.02% U while sandstone samples, on which assays were incomplete, were estimated to range from 0.02 to 0.05% U; uranium-bearing sandstone occurrences are small, usually less than 50 ft. long and 1-2 ft. thick, the largest being discontinuously radioactive along a strike length of 250 ft.; sandstone is medium to fine-grained, arkosic, and commonly mixed with clay pebbles where uranium content is greatest; none of the known occurrences of either uranium-bearing argillite or sandstone is economically significant: 995; assays of samples from Hunterdon County, New Jersey and Bucks County, Pennsylvania, show that the radioactive argillite in the Lockatong formation of Triassic age usually contains from 0.005 to 0.01% U and the sandstone in the Stockton formation of the same age contains from 0.01 to 0.03% U; comparison of these occurrences with similar ones in other parts of the world suggests that neither the Lockatong nor the Stockton formation is likely to contain high-grade U deposits: 996.

PENNSYLVANIA (contd.)

Bucks County (contd.)

Argillite, Uranium-bearing

Delaware quarry, 2 mi. N of Pt. Pleasant: area 600 x 300 ft. mapped at a scale of 1:360 because of the occurrence there of the most uraniferous and best exposed argillite outcrops; mapping indicated that uranium may not be coextensive with a bed for more than several hundred feet but uranium zones do not transect bedding: 995.

Geophysical Exploration (Airborne)

General: no significant radioactivity found in a 25-day survey with an airborne scintillometer in a plane flying 100 ft. above the ground over an area of west-central New Jersey and eastern Pennsylvania extending from Clinton through Flemington to Lambertville in New Jersey and west to Doylestown, Pennsylvania: 1086.

Radioactive Magnetite

Boyer and Kohl mines, 2.5 mi. SW of Durham Furnace: no radioactivity reported although dumps have well-banded quartz-magnetite-chlorite rock with some hematite in vein quartz: 843.

Durham mines on Mine Hill, 2 mi. SW of Durham Furnace: no radioactivity reported in disseminated and massive magnetite deposit at Byram(?) gneiss but grab sample of magnetite ore from dump gave 0.001% eU: 843.

PENNSYLVANIA (contd.)

Bucks County (contd.)

Radioactive Magnetite

Durham Furnace mines on Rattlesnake Hill, 1 mi. SW of Durham Furnace: maximum radioactivity of magnetite, disseminated or as bands in very quartzitic gneiss, 0.05 mr/hr; radioactivity of sample of magnetite ore from tunnel, 0.003% eU and same for feldspar-quartz-magnetite rock sample from NE side of Rattlesnake Hill: 843.

Durham Furnace at Durham Furnace: no radioactivity reported for slag from old iron furnace now being used for road metal but sample of slag from dump gave 0.002% eU: 843.

Radioactive Rocks

Pipersville, 1.5 mi. N of, on U.S. Highway 611: roadcut exposes shale and mudstone near top of Triassic Lockatong formation; the 3-ft. layer of shaly mudstone is radioactive for the full extent of its 500 ft. outcrop with 0.005 to 0.01% eU; two channel samples from most radioactive part of mudstone showed 0.027 and 0.010% eU: 994.

Sandstone, Uranium-bearing

General: ten occurrences of uranium-bearing argillite in the Lockatong formation and three occurrences of uranium-bearing sandstone in the Stockton formation, both of Triassic age, in Bucks County, Pennsylvania and in Hunterdon County, New Jersey; argillite contains as much as 0.05% U but usually from 0.01 to 0.02% U while sandstone samples, on which assays were incomplete, were estimated to range from 0.02 to 0.05% U; uranium-bearing sandstone occurrences are small, usually less than 50 ft. long and 1-2 ft. thick, the largest being discontinuously radioactive along a strike length of 250 ft.; sandstone

PENNSYLVANIA (contd.)

Bucks County (contd.)
Sandstone, Uranium-bearing
General:
is medium to fine-grained, arkosic, and commonly mixed with clay pebbles where U content is greatest; none of the known occurrences of either uranium-bearing argillite or sandstone is economically significant: 995; assays of samples from Hunterdon County, New Jersey, and Bucks County, Pennsylvania, show that the radioactive argillite in the Lockatong formation of Triassic age usually contains from 0.005 to 0.01% U and the sandstone in the Stockton formation of the same age contains from 0.01 to 0.03% U; comparison of the lithologic and mineralogic characteristics of these occurrences with similar ones in other parts of the world suggests that neither the Lockatong nor the Stockton formation is likely to contain high-grade U deposits: 996.
Uranium Exploration
General: no significant radioactivity found in a 25-day survey with an airborne scintillometer in a plane flying 100 ft. above the ground over an area of west-central New Jersey and eastern Pennsylvania extending from Clinton through Flemington to Lambertville in New Jersey and west to Doylestown, Pennsylvania: 1086.

PENNSYLVANIA (contd.)

Bucks County (contd.)
Uranium Exploration
Geophysical Exploration (Airborne)
General: no significant radioactivity found in a 25-day survey with an airborne scintillometer in a plane flying 100 ft. above the ground over an area of west-central New Jersey and eastern Pennsylvania extending from Clinton through Flemington to Lambertville in New Jersey and west to Doylestown, Pennsylvania: 1086.
Uranium Occurrences
General: ten occurrences of uranium-bearing argillite in the Lockatong formation and three occurrences of uranium-bearing sandstone in the Stockton formation, both of Triassic age, in Bucks County, Pennsylvania and in Hunterdon County, New Jersey; argillite contains as much as 0.05% U but usually from 0.01 to 0.02% U while sandstone samples, on which assays were incomplete, were estimated to range from 0.02 to 0.05% U; uranium-bearing sandstone occurrences are small, usually less than 50 ft. long and 1-2 ft. thick, the largest being discontinuously radioactive along a strike length of 250 ft.; sandstone is medium to fine-grained, arkosic, and commonly mixed with clay pebbles where U content is greatest; none of the known occurrences of either uranium-bearing argillite or sandstone is economically significant: 995; assays of samples from Hunterdon County, New Jersey, and Bucks County, Pennsylvania, show that the radioactive argillite in the Lockatong formation of Triassic age usually contains from 0.005 to 0.01% U and the sandstone in the Stockton formation of the same age contains from 0.01 to 0.03% U;

PENNSYLVANIA (contd.)

Bucks County (contd.)
Uranium Occurrences
General:
comparison of the lithologic and mineralogic characteristics of these occurrences with similar ones in other parts of the world suggest that neither the Lockatong nor the Stockton formation is likely to contain high-grade U deposits: 996.
Delaware quarry, 2 mi. N of Pt. Pleasant: area 600 x 300 ft. mapped at a scale of 1:360 because of the occurrence there of the most uraniferous and best exposed argillite outcrops; mapping indicated that uranium may not be coextensive with a bed for more than several hundred feet but uranium zones do not transect bedding: 995.
Argillite, Uranium-bearing
General: ten occurrences of uranium-bearing argillite in the Lockatong formation and three occurrences of uranium-bearing sandstone in the Stockton formation, both of Triassic age, in Bucks County, Pennsylvania and Hunterdon County, New Jersey; argillite contains as much as 0.05% U but usually from 0.01 to 0.02% U while sandstone samples, on which assays were incomplete, were estimated to range from 0.02 to 0.05% U; uranium-bearing sandstone occurrences are small, usually less than 50 ft. long and 1-2 ft. thick, the largest being discontinuously radioactive along a strike length of 250 ft.; sandstone is medium to fine-grained, arkosic, and commonly mixed with clay pebbles where

PENNSYLVANIA (contd.)

Bucks County (contd.)
Uranium Occurrences
Argillite, Uranium-bearing
General:
uranium content is greatest; none of the known occurrences of either uranium-bearing argillite or sandstone is economically significant: 995; assays of samples from Hunterdon County, New Jersey and Bucks County, Pennsylvania, show that the radioactive argillite in the Lockatong formation of Triassic age usually contains from 0.005 to 0.01% U and the sandstone in the Stockton formation of the same age contains from 0.01 to 0.03% U; comparison of the lithologic and mineralogic characteristics of these occurrences with similar ones in other parts of the world suggests that neither the Lockatong nor the Stockton formation is likely to contain high-grade U deposits: 996.
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PENNSYLVANIA (contd.)

Bucks County (contd.)
Uranium Occurrences
Sandstone, Uranium-bearing
General:
U while sandstone samples, on which assays were incomplete, were estimated to range from 0.02 to 0.05% U; uranium-bearing sandstone occurrences are small, usually less than 50 ft. long and 1-2 ft. thick, the largest being discontinuously radioactive along a strike length of 250 ft.; sandstone is medium to fine-grained, arkosic, and commonly mixed with clay pebbles where U content is greatest; none of the known occurrences of either uranium-bearing argillite or sandstone is economically significant: 995; assays of samples from Hunterdon County, New Jersey and Bucks County, Pennsylvania, show that the radioactive argillite in the Lockatong formation of Triassic age usually contains from 0.005 to 0.01% U and the sandstone in the Stockton formation of the same age contains from 0.01 to 0.03% U; comparison of the lithologic and mineralogic characteristics of these occurrences with similar ones in other parts of the world suggests that neither the Lockatong nor the Stockton formation is likely to contain high-grade U deposits: 996.

PENNSYLVANIA (contd.)

Butler County
Radioactive Coal
Butler quadrangle
Chutz Brothers strip mine on E side of Pennsylvania Highway 8, 2 mi. N of Unionville: radioactivity of Middle Kittanning coal in two coals separated by non-radioactive coal, both less than 0.001% eU: 893.
Hilliards quadrangle
Allison Engineering Co. strip mine at Hilliards: radioactivity of Brookville coal between two siltstones, Lower Clarion coal between siltstones, and Upper Clarion coal between siltstone and mudstone, all less than 0.001% eU: 893.
Allison Engineering Co. strip mine 1.5 mi. S of Pennsylvania Highway 338 in right fork of North Branch Bear Creek: radioactivity of Lower Clarion coal between mudstone and gray carbonaceous shale, less than 0.001% eU: 893.
Allison Engineering Co. strip mine 1½ mi. E of Pennsylvania Highway 38 on road to Annisville: radioactivity of Lower Freeport coal between sandstone and clay, less than 0.001% eU: 893.
Carbon Coal Co. strip mine near Pisgah school: radioactivity of Upper Kittanning coal in two coals, one with pyrite stringers, separated by mudstone, less than 0.001% eU: 893.
Carbon Coal Co. strip mine on S side of Murrinsville-Cherry Valley road, 1½ mi. W of Cherry Valley: radioactivity of Middle Kittanning coal in two coals separated by shale, both less than 0.001% eU: 893.

PENNSYLVANIA (contd.)

Butler County (contd.)
Radioactive Coal
Hilliards quadrangle
Tri-County Coal Co. strip mine on W side of Pennsylvania Highway 308, 4 mi. S of Murrinsville: radioactivity of Middle Kittanning coal in two coals separated by clay parting, both less than 0.001% eU: 893.
Tri-County Coal Co. strip mine on W side of Pennsylvania Highway 308, 4¼ mi. S of Murrinsville: radioactivity of Lower Kittanning coal in two coals separated by clay parting, both less than 0.001% eU: 893.
Kittanning quadrangle
North Star Coal Co. strip mine on N side of U. S. Highway 22, 4 mi. W of Worthington: radioactivity of Upper Kittanning coal in two coals separated by gray pyritic siltstone, both less than 0.001% eU: 893.
Zelienople quadrangle
Kerry's Coal Co. strip mine on U. S. Highway 19, ½ mi. S of Portersville: radioactivity of Upper Freeport coal in two coal beds separated by pyrite, both less than 0.001% eU: 893.
Tasa Coal Co. strip mine on Little Connoquenessing Creek on E side of Pennsylvania Highway 528, 5 mi. N of Evans City: radioactivity of Upper Kittanning coal between shale and mudstone, less than 0.001% eU: 893.

PENNSYLVANIA (contd.)

Cambria County
Radioactive Coal
Altoona quadrangle
C. A. Hughes Coal Co. strip mine at Blandburg: radioactivity of Upper Freeport coal in two coals separated by shale and siltstone, both less than 0.001% eU: 893.
Gibson Coal Co. strip mine, 3 mi. E of Ashville: radioactivity of Lower Freeport coal, in blocky canneloid coal and an impure coal separated by shale, both 0.001% eU, and in the coal with pyrite at the base and underlying the impure coal, less than 0.001% eU; radioactivity of Upper Freeport coal between shale and clay, less than 0.001% eU: 893.
Grannas Brothers Coal Co. strip mine, ½ mi. SW of Daugherty: radioactivity of Middle Kittanning coal with no cover in place, less than 0.001% eU: 893.
Powell Coal Co. strip mine, ½ mi. E of Glasgow: radioactivity of Lower Kittanning coal between shale and siltstone, less than 0.001% eU: 893.
Reynolds Coal Co. strip mine, 2 mi. NE of Van Ormer: radioactivity of Lower Freeport coal, in two coals separated by gray shale, both less than 0.001% eU: 893.
Barnesboro quadrangle
Barnes & Tucker Coal Co. drift mine near Nicktown: radioactivity of Upper Freeport coal between bony coal and clay, less than 0.001% eU: 893.

PENNSYLVANIA (contd.)

Cambria County (contd.)
Radioactive Coal
Barnesboro quadrangle
McCormick Coal Co. drift mine at Barnesboro
Main "B" tramway: radioactivity of Lower Freeport coal in two coals separated by non-radioactive bony coal, both less than 0.001% eU: 893.
Straight main tramway: radioactivity of Lower Freeport coal between siltstone and clay, less than 0.001% eU: 893.
Sterling Coal Co. drift mine SE of Vetera: radioactivity of Upper Freeport coal between bony coal and clay, less than 0.001% eU: 893.
Ebensburg quadrangle
H. C. Horner Coal Co. drift mine, 2.1 mi. S of Dunlo: radioactivity of Upper Freeport coal between shale and clay, less than 0.001% eU: 893.
Lick Run Coal Co. strip mine at Onnalinda: radioactivity of Upper Freeport coal between two gray shales, less than 0.001% eU: 893.
Marion Coal Co. drift mine, 2.3 mi. S of Dunlo: radioactivity of Lower Kittanning coal, less than 0.001% eU: 893.
Johnstown quadrangle
A. C. Shank Coal Co. drift mine on Solomen's Run, 2 mi. E of Dale: radioactivity of Upper Kittanning coal between fissile carbonaceous shale and clay, less than 0.001% eU: 893.

PENNSYLVANIA (contd.)

Cambria County (contd.)
Radioactive Coal
Johnstown quadrangle
Bill's C Prime Coal Co. drift mine on St. Clair Run: radioactivity of Lower Kittanning Rider coal between bony coal and clay, less than 0.001% eU: 893.
G. B. T. Coal Co. drift mine on Pennsylvania Highway 22, 2 3/4 mi. SW of Nanty Glo: radioactivity of Lower Kittanning coal between shale and clay, less than 0.001% eU: 893.
Patton quadrangle
Dysart Coal Co. drift mine, 2.3 mi. SE of Dysart: radioactivity of Lower Kittanning coal with pyrite stringers, less than 0.001% eU: 893.
Greenbank Coal Co. drift mine at Bonifacius: radioactivity of Upper Kittanning coal, less than 0.001% eU: 893.
North Cambria Fuel Co. strip mine, 1 mi. S of Hastings: radioactivity of Lower Freeport coal, less than 0.001% eU: 893.
Susquehanna Fuel Co. drift mine, 1 mi. S of Hastings: radioactivity of Upper Freeport coal, in two coals separated by shale parting, both less than 0.001% eU: 893.
W. A. Scanlon & Son Coal Co. strip mine, ½ mi. N of Ashville: radioactivity of Upper Freeport coal in two coals, one with pyritic lenses, separated by shale, both less than 0.001% eU: 893.

PENNSYLVANIA (contd.)

Carbon County

Andersonite Occurrences

Jim Thorpe (formerly Mauch Chunk)

Mount Pisgah: carnotite discovered here in 1874 on property now owned by Lehigh Coal and Navigation Co.; sporadic bright yellow surface coatings are visible on cliff face as basal Pottsville conglomerate over a distance of a half-mile along U. S. Highway 309; U.S.A.E.C. geologists investigated occurrence early in 1952 and U.S.G.S. geologists also studied area; this interest led company to carry out an extensive program of exploratory mining and diamond drilling; minerals found there in recent geologic studies include: carnotite, tyuyamunite, and an unknown uranium mineral , possibly uraninite, as well as uranium carbonate efflorescences including some schroeckingerite, an unverified as yet but reported kasolite occurrence, and liebigite, andersonite, and uranophane; origin: 867.

Autunite Occurrences

Jim Thorpe (formerly Mauch Chunk): autunite as pale yellowish incrustation on Pottsville conglomerate and associated with carnotite at the occurrence on the south side of U. S. Highway 209 about 1 mi. W of C.R.R.N.J. station: 1042; small scales of autunite in a conglomerate: 762; earliest discovery of carnotite in United States reported here in 1874 in the conglomerate of Pottsville formation; two other discoveries were made as recently as 1951 in the same area, one in Pottsville conglomerate and the other in

PENNSYLVANIA (contd.)

Carbon County (contd.)

Autunite Occurrences

Jim Thorpe (formerly Mauch Chunk): Pocono sandstone; exploration work has revealed several hundred feet of mineralization of which sections are of commercial grade; in addition to the original carnotite, considerable autunite and an unidentified black radioactive mineral have been reported from the area: 883; radioactive minerals present and, when given, intensity of radiograph on photographic plate: autunite, crystalline scales, moderately active uranochre(?), thin coating, moderately active: 1018.

Jim Thorpe (formerly Mauch Chunk)

Mauch Chunk ridge, in roadcut along U. S. Highway 309 and along Central Railroad of New Jersey tracks: uranium deposit owned partly by Lehigh Coal and Navigation Co. and partly by Stuart Evans; deposit was prospected by core drilling in 1953 and occurs in uraniferous sandstone in the Cherry Ridge red beds of the Catskill formation; the uranium-bearing rock occurs discontinuously for about a mile along the strike and 700 ft. along the dip of the Catskill formation; autunite, kasolite, and uranophane occur on joint surfaces and in cracks in the rock but are not conspicuous on the outcrops; the most radioactive part of the formation is an unidentified black or gray material disseminated in the matrix; radioactivity measurement and two chemical analyses of three grab samples gave the following results: 0.034% eU and 0.030 and 0.031% U; 0.017% eU and 0.012 and 0.011% U; and 0.10% eU and in both analyses, 0.13% U: 817.

PENNSYLVANIA (contd.)

Carbon County (contd.)
Carnotite Occurrences
Jim Thorpe (formerly Mauch Chunk): earliest discovery of carnotite in United States reported here in 1874 in the conglomerate of Pottsville formation; two other discoveries were made as recently as 1951 in the same area, one in Pottsvile conglomerate and the other in Pocono sandstone; exploration work has revealed several hundred feet of mineralization of which sections are of commercial grade; in addition to the original carnotite, considerable autunite and an unidentified black radioactive mineral have been reported from the area: 883; carnotite was first discovered in the anthracite region in 1902 within 7 mi. of point on Summit Hill where coal was first discovered in the county in 1791: 917; carnotite occurs on ledge of conglomerate rocks which form transition strata between Mauch Chunk red shale and Pottsville conglomerate at a ½ mile west of bridge crossing Lehigh River to East Mauch Chunk and on south side of Eastern Pennsylvania R.R. where R. R. cut was made by blasting away the mountain side: 917; carnotite appears as green and canary yellow daubs or splashes on rock and impregnates foreign matter deposited in crevices, which are 1-2 ft. long and not more than 1 inch wide: 917; rock must contain 2% carnotite in order to be worked profitably and should be drilled to see if it contains enough ore to work: 917; carnotite: 20, 46; carnotite in conglomerate: 444; carnotite in Pottsville conglomerate on side of Mount Pisgah; possible origins suggested: 874;

PENNSYLVANIA (contd.)

Carbon County (contd.)
Carnotite Occurrences
Jim Thorpe (formerly Mauch Chunk): carnotite in sandstones of Pottsville formation of Pennsylvanian age and Willards Cherry Ridge red beds of Upper Devonian age: 509; carnotite as yellow scattered streaks and patches on coarse grained Pottsville conglomerate outcropping along U. S. Highway 209 a few hundred feet NW of the bridge over the Lehigh River (to East Mauch Chunk); Lehigh Coal and Navigation Co. to put a pilot uranium mine into operation to determine if large scale production is feasible since ore is of good quality: 1077; carnotite deposits in sandstone, similar to Colorado Plateau, on land of Lehigh Coal and Navigation Co. to be mined; first contract for purchase of uranium ore in eastern United States being negotiated between U.S.A.E.C. and company: 1083; first uranium producing mine in east at edge of Pocono Mountains; Lehigh Coal and Navigation Co. has driven an adit into the orebody embedded in Pottsville conglomerate located in base of coal measures and containing carnotite and a substance resembling pitchblende; U.S.A.E.C. will take all the uranium produced and stockpile it since there are no uranium mills in eastern United States; presence of carnotite has been recognized here since early 1800's: 1084; a supposed autunite is carnotite, similar to Colorado ore, found on top of Mauch Chunk red shale in layers of conglomerate about 1 mi. from town and W of Lehigh River; probably was extracted from intercalated lenses of black shale and graywacke and may have same origin as ore in western United States:

PENNSYLVANIA (contd.)

Carbon County (contd.)
Carnotite Occurrences
Jim Thorpe (formerly Mauch Chunk):
1015; autunite as pale yellowish incrustation on Pottsville conglomerate and associated with carnotite at the occurrence on the south side of U. S. Highway 209 about 1 mi. W of C.R.R.N.J. station: 1042; Pottsville conglomerate on route U. S. Highway 309 contains carnotite probably also zippeite, and thin fluorescent coating of schroeckingerite: 1078; pitchblende and carnotite in sandy lenses in Pottsville conglomerate in deposits being explored by Lehigh Coal and Navigation Co.: 765; uranothallite, not schroeckingerite, found in carnotite locality; mineral identified by X-ray analysis by United States government: 1087; shaft sunk by Lehigh Coal and Navigation Co. for further examination of uranium mineralization, known since 1874 and identified as carnotite in 1908: 1076; U.S.A.E.C. airborne radioactivity survey to determine extent of uranium mineralization in ground in this area; presence of uranium mineral known since 1874 but not studied until 1908 when identified as carnotite; additional occurrences, of which commercial value and size are unknown, reported recently and survey will help determine whether further exploration is warranted: 1075; airborne radiometric reconnaissance by Safair Flying Services, Inc., for U.S.A.E.C. to determine if further exploration of carnotite deposit was warranted: 1076.

PENNSYLVANIA (contd.)

Carbon County (contd.)
Carnotite Occurrences
Jim Thorpe (formerly Mauch Chunk)
Mauch Chunk ridge, E end, in gap cut by Lehigh River between it and Bear Mountain: uranium occurrences found here in 1949 by U.S.G.S. geologist during a radiometric survey along U. S. Highway 309; uranium-bearing strata are olive-gray sandstones at the bottom of a thick series of dominantly red (grayish-red) sandstone, pebbly sandstones, siltstones, and shales of the Catskill continental facies, and this series may constitute the whole of the Cherry Ridge group of beds; stratigraphically the uranium horizon is 4,150 ft. below the base of the Pottsville and 2,000 ft. below the Mauch Chunk shale; the radioactive zone is 6-10 ft. wide and traceable up the cliff face for 30 ft.; there may be a relationship between the presence of poorly preserved plant fossils, in the zone of highest activity, and the highest concentration of visible uranium minerals; meta-autunite and other uranium minerals were found here; similar deposit was found about 3/4 mi. further E along the Central Railroad of New Jersey, where a gray sandstone contained olive-gray mud pellets and several thin clay seams, and conspicuous yellow and apple-green coatings of carnotite and other uranium minerals on bedding and closely spaced fracture surfaces; this zone is approximately 3 ft. wide and the entire radioactive zone, measured stratigraphically, is nearly 20 ft. wide; scintillometer readings at three locations between the two occurrences were significantly high although no uranium minerals were visible at the outcrops: 733.

PENNSYLVANIA (contd.)

Carbon County (contd.)
Carnotite Occurrences
Jim Thorpe (formerly Mauch Chunk)
Mauch Chunk ridge ½ mi. S of Jim Thorpe (formerly Mauch Chunk) on S side of U. S. Highway 309: uranium minerals in nearly vertical Catskill beds of upper Devonian age; meta-autunite in flaky aggregates and plates on fracture surfaces in sandstone and some uranium mineralization associated with carbonized plant remains; this occurrence was noted first by F. A. McKeown of U.S.G.S. in 1949 while making a radiometric survey of the area, and, more recently carnotite has been found below the highway in the same general area along the same stratigraphic horizon; mineralogical studies revealed presence of meta-uranocircite and meta torbernite as well as meta-autunite; origin: 867.
Mount Pisgah: carnotite: 7, 82, 78, 635; carnotite known here since 1874 on property now owned by Lehigh Coal and Navigation Co.; uranium is found in basal sandstone and conglomerate member of Pottsville formation; uranium minerals identified here include carnotite, tyuyamunite, liebigite, uranophane, and a black radioactive material in the matrix of the rock; minerals occur as coatings on fracture surfaces and slickenside surfaces and as incrustations on loosely cemented quartz pebbles in conglomerate and some uranium occurs in cracks, in pebbles, in calcite cement filling cracks, and in black material in matrix of rock;

PENNSYLVANIA (contd.)

Carbon County (contd.)
Carnotite Occurrences
Jim Thorpe (formerly Mauch Chunk)
Mount Pisgah:
some secondary mineralization occurs on surfaces of broken rock: 817; carnotite known since 1874 in Pottsville conglomerate: 1098; carnotite in Pottsville conglomerate, torbernite(?): 766; carnotite discovered here in 1874 on property now owned by Lehigh Coal and Navigation Co.; sporadic bright yellow surface coatings are visible on cliff face of basal Pottsville conglomerate over a distance of a half-mile along U. S. Highway 309; U.S.A.E.C. geologists investigated occurrence early in 1952 and U.S.G.S. geologists also studied area; this interest led company to carry out an extensive program of exploratory mining and diamond drilling; minerals found there in recent geologic studies include: carnotite, tyuyamunite, and an unknown uranium mineral, possibly uraninite, as well as uranium carbonate efflorescences including some schroeckingerite, an unverified as yet but reported kasolite occurrence, and liebigite, andersonite, and uranophane; origin: 867; uranium occurrence known for many years, extending along U. S. Highway 309 for about 2,700 ft., as carnotite in Pottsville conglomerate and sandstone; property owned by Lehigh Coal and Navigation Co., which has done considerable exploration work; investigations also made by U.S.A.E.C. and U.S.G.S.; carnotite, only U mineral known here until 1952, is the most conspicuous mineral occurring in the conglomerate lenses in fractures, in spaces

PENNSYLVANIA (contd.)

Carbon County (contd.)
Carnotite Occurrences
Jim Thorpe (formerly Mauch Chunk)
Mount Pisgah:
between pebbles, and in fractures within pebbles and in the sandstone, only in fractures, especially shears; it is associated with tyuyamunite; a black, radioactive mineral, possibly some form of uraninite, occurs disseminated through the dark sandstones and conglomerates and is highest in U_3O_8 when it contains a high percentage of carbonaceous material; where carbonaceous lenses are associated with shears having slickenside surfaces on which secondary yellow and green minerals are present, radioactivity is very high, while non-carbonaceous rocks cut by such shears exhibit negligible or no radioactivity; one or two fossil logs, exposed on outcrop, are associated with high concentrations of carnotite: 733; uranium concentration seems to be controlled here by lenses with a high percentage of carbonaceous material and, to a lesser degree, by fractures, of which most are parallel to the strata, so that the most radioactive rock bodies are lenticular and have their longest dimensions parallel to the strata; a few irregularly-shaped radioactive bodies develop when cross-cutting shears intersect favorable rock masses of irregular shape but these are the exception not the rule; radioactive lenses are confined almost entirely to the middle unit of the uranium-bearing member of the Pottsville formation;

PENNSYLVANIA (contd.)

Carbon County (contd.)
Carnotite Occurrences
Jim Thorpe (formerly Mauch Chunk)
Mount Pisgah:
in a zone averaging 26 ft. in thickness as revealed by drilling; the lenses vary from a few inches to about 6 ft. in thickness and rarely exceed 20 ft. in length; radioactivity along the outcrop is pronounced, with several hundred counts per minute or higher, over a background of 30 to 40 counts, being recorded on a scintillometer over an aggregate distance of more than 500 ft.; chemical analyses of representative samples from several lenses showed an average U_3O_8 content of 0.2-0.5%: 733; carnotite orebodies are usually only a few inches in diameter except for one pocket, near the east end of the cut, which is 10 ft. wide; their extent into the mountain is unknown but probably does not go below groundwater level and may be restricted to a very shallow zone, since the carnotite evidently was deposited by circulating surface waters: 1017; carnotite in 40-ft. layer of coarse-grained conglomerate lying near the base of the Pottsville formation (Pennsylvanian) and just above the red Mauch Chunk shale (Mississippian) in strata dipping 30-60° S into the mountains: 1017; carnotite occurs thoroughly but unevenly distributed throughout the conglomerate as filling in openings and in cracks in pebbles or coatings on the slickenside surfaces in the harder quartzitic type conglomerate but, for the most part, as a replacement of the calcareous cement of certain parts of the conglomerate

PENNSYLVANIA (contd.)

Carbon County (contd.)
Carnotite Occurrences
Jim Thorpe (formerly Mauch Chunk)
Mount Pisgah:
forming bodies or pockets irregular in size and shape: 1017; chemical composition of carnotite; two chemical analyses for uranium and vanadium by separation by nitric acid evaporation method and weighing as oxides gave: 1) 23.8 UO_3 and 7.2 V_2O_5; and 2) 31.11 UO_3 and 9.80 V_2O_5; and after removal of insoluble matter, water, and iron oxide gave, respectively, 69.8 UO_3 and 21.1 V_2O_5, and 68.99 UO_3 and 21.73 V_2O_5; a theoretical composition of potassio-carnotite on a water-free basis gave 67.64 UO_3 and 21.34 V_2O_5: 1017; an analysis of a small specimen of carnotite-bearing rock gave 4.4% uranium oxide but this was a rich sample and probably very little material runs over 1%: 1017; commercial value of deposit: 1017; geology: 1017; history of deposit; uranium first reported there in 1874 but not identified as carnotite until 1908: 1017; origin of carnotite; disintegration of Precambrian and early Paleozoic crystalline rocks, commonly carrying uranium and vanadium minerals, which previously surrounded this region, and precipitation of minerals carrying the heavier metals from groundwater in "black sand" lenses because of their having a higher specific gravity than the quartz which makes up most of the sediments: 1017.

PENNSYLVANIA (contd.)

Carbon County (contd.)
Carnotite Occurrences
Jim Thorpe (formerly Mauch Chunk)
Mount Pisgah, E end of: carnotite occurs in the synclinal mass of Mount Pisgah as scattered streaks and patches, very irregularly distributed in the lower portion of the conglomerate of the Pottsville formation; conglomerate also contains lenses of non-carbonaceous black shale: 1016; origin: in its present form, the carnotite was deposited by circulating waters but its original source in the formation was probably the lenses of black shale, which owes its color to the presence of very finely divided hornblende, biotite, and similar dark minerals and not to carbon; uranium may have been derived from metamorphic rocks of the New York-Pennsylvania Highlands, which contain radioactive minerals, and then accumulated in the fine black sand lenses with the vanadium; some pebbles in the conglomerate may contain uranium but evidence of this has not been found so far; development of the carnotite deposits appears to have been made possible by mechanical concentration of uranium and vanadium minerals, originally distributed in large bodies of crystalline rocks, brought about by a sudden change from a dry to a moist climate; a similar origin may explain the presence of carnotite in rocks of Colorado and Utah and also the frequent association of uranium and vanadium with coal: 1016; chemical analysis of the carnotite gave 7.2% V_2O_5, 23.8% UO_3, 6.1% F_2O_3, 1.5% CaO, 1.6% K_2O (diff.), 10.5% H_2O, and 49.3%

PENNSYLVANIA (contd.)

Carbon County (contd.)
Carnotite Occurrences
Jim Thorpe (formerly Mauch Chunk)
Mount Pisgah, E end of:
insoluble material; after extraction of the water, iron, and insoluble material, another chemical analysis gave 21.1% V_2O_5, 69.8% UO_3, 4.4% CaO, and 4.7% K_2O (diff.); these analyses compared favorably with those for Colorado and South Australian carnotites and the mineral is considered to belong to the uraninite group: 1016; mineral, called autunite but later identified as carnotite, first discovered in 1874; carnotite forms an amorphous to minutely crystalline bright yellow coating or impregnation in the conglomerate and often penetrates the quartz pebbles; microscopic examination showed the mineral to be quite impure, containing much limonite and clayey material: 1016.
Mount Pisgah, roadcut on Pennsylvania Highway 29-209 W of town on N flank of:
uranium deposit in basal Pennsylvanian Pottsville formation, a highly siliceous dark gray quartz conglomerate; an irregular but conspicuous yellow coating of carnotite and other secondary uranium minerals occurs for 2,000 ft. and a black uranium oxide, probably uraninite, occurs below the weathered surface; detailed sampling shows that U concentrations cut slightly across the bedding down dip, perhaps controlled by jointing, and distribution along the strike is irregular with the uranium-bearing material forming shoots rather than

PENNSYLVANIA (contd.)

Carbon County (contd.)
Carnotite Occurrences
Jim Thorpe (formerly Mauch Chunk)
Mount Pisgah, roadcut on Pennsylvania Highway 29-209 W of town on N flank of:
tabular sheets; in the main stope, a conspicuous fault forms the back and the long direction of the ore shoot parallels the slickensides; occurrence has been known since 1874 and is being developed by the Lehigh Coal and Navigation Co.: 1005.
Origin
Jim Thorpe (formerly Mauch Chunk)
Origin: Mount Pisgah carnotite occurs in the synclinal mass at E end of Mount Pisgah as scattered streaks and patches, very irregularly distributed, in the lower portion of the conglomerate of the Pottsville formation; conglomerate also contains lenses of non-carbonaceous black shale; origin: in its present form, the carnotite was deposited by circulating waters but its original source in the formation was probably the lenses of black shale, which owes its color to the presence of very finely divided hornblende, biotite, and similar dark minerals and not to carbon; uranium may have been derived from metamorphic rocks of the New York-Pennsylvania Highlands, which contain radioactive minerals, and then accumulated in the fine black sand lenses with the vanadium; some pebbles in the conglomerate may contain uranium but evidence of this has not been found so far; development of the carnotite deposits appears to have been made possible by mechanical concentration of uranium and

PENNSYLVANIA (contd.)

Carbon County (contd.)
Carnotite Occurrences
Origin
Jim Thorpe (formerly Mauch Chunk)
Origin:
vanadium minerals, originally distributed in large bodies of crystalline rocks, brought about by a sudden change from a dry to a moist climate; a similar origin may explain the presence of carnotite in rocks of Colorado and Utah and also the frequent association of uranium and vanadium with coal: 1016; carnotite at Mount Pisgah; disintegration of Precambrian and early Paleozoic crystalline rocks, commonly carrying uranium and vanadium minerals which previously surrounded this region and precipitation of minerals carrying the heavier metals from groundwater in the "black sand" lenses because of their having a higher specific gravity than the quartz which makes up most of the sediments: 1017.

~~Clarkeite Occurrences~~
~~Easton, north of: small segregations resembling clarkeite or gummite in serpentine; chemical analysis gave 42.70 U_3O_8 or 36.21 U and 25.06 ThO_2 or 22.03 Th; calculated geologic age, 590 m.y.: 1012.~~

Geophysical Exploration (Airborne)
Jim Thorpe (formerly Mauch Chunk):
airborne reconnaissance by Safair Flying Services, Inc., for U.S.A.E.C. to determine if further exploration of carnotite deposit was warranted: 1076; U.S.A.E.C. airborne radioactivity survey to determine extent of uranium mineralization in ground in this area; presence of uranium

PENNSYLVANIA (contd.)

Carbon County (contd.)
Geophysical Exploration (Airborne)
Jim Thorpe (formerly Mauch Chunk):
mineral known since 1874 but not studied until 1908 when identified as carnotite; additional occurrences, of which commercial value and size are unknown, reported recently and survey will help determine whether further exploration is warranted: 1075.

~~Gummite Occurrences~~
~~Easton, north of: small segregations resembling clarkeite or gummite in serpentine; chemical analysis gave 42.70 U_3O_8 or 36.21 U and 25.06 ThO_2 or 22.03 Th; calculated geologic age, 590 m.y.: 1012.~~

Kasolite Occurrences
Jim Thorpe (formerly Mauch Chunk)
Mauch Chunk ridge, in roadcut along U. S. Highway 309 and along Central Railroad of New Jersey tracks: uranium deposit owned partly by Lehigh Coal and Navigation Co. and partly by Stuart Evans; deposit was prospected by core drilling in 1953 and occurs in uraniferous sandstone in the Cherry Ridge red beds of the Catskill formation; the uranium-bearing rock occurs discontinuously for about a mile along the strike and 700 ft. along the dip of the Catskill formation; autunite, kasolite, and uranophane occur on joint surfaces and in cracks in the rock but are not conspicuous on the outcrops; the most radioactive part of the formation is an unidentified black or gray material disseminated in the matrix; radioactivity measurement and two chemical analyses of three grab samples gave the following results: 0.034% eU and 0.030 and 0.031% U; 0.017% eU and 0.012 and 0.011% U; and 0.10% eU and, in both analyses, 0.13% U: 817.

PENNSYLVANIA (contd.)

Carbon County (contd.)
Kasolite Occurrences
Jim Thorpe (formerly Mauch Chunk)
Mount Pisgah: carnotite discovered here in 1874 on property now owned by Lehigh Coal and Navigation Co.; sporadic bright yellow surface coatings are visible on cliff face of basal Pottsville conglomerate over a distance of a half-mile along U. S. Highway 309; U.S.A.E.C. geologists investigated occurrence early in 1952 and U.S.G.S geologists also studied area; this interest led company to carry out an extensive program of exploratory mining and diamond drilling; minerals found there in recent geologic studies include: carnotite, tyuyamunite, and an unknown uranium mineral, possibly uraninite, as well as uranium carbonate efflorescences including some schroeckingerite, an unverified as yet but reported kasolite occurrence, and liebigite, andersonite, and uranophane; origin: 867.
Penn Haven Junction, 0.4 mi. S of station, on both sides of Lehigh River: uranium deposit on land owned by Lehigh Coal and Navigation Co. on W side of river and by the Commonwealth of Pennsylvania on E side of river; no development work has been done yet; uranium-bearing rock at an elevation of 720 ft. in upper part of Catskill formation in a local anticline on N limb of Broad Mountain anticline; mineralized rock is gray to greenish-gray, medium grained graywacke; on E side of river rock occurs along an abandoned railroad bed and is less radioactive

PENNSYLVANIA (contd.)

Carbon County (contd.)
Kasolite Occurrences
Jim Thorpe (formerly Mauch Chunk)
Penn Haven Junction:
than that on W side of river, so no detailed sampling was done here; on the W side of river, the rock outcrops for about 300 ft. along the Lehigh Valley railroad tracks in a zone between the track level and 10 ft. above it; kasolite and an unidentified yellow fluorescent mineral, probably uranophane, occur sparingly as flakes and incrustations on bedding-plane and fracture surfaces and uranium is also disseminated in the rock; radioactivity measurement and two chemical analyses of 12 chip samples and 1 grab sample gave the following results: for the 12 chip samples, a range of 0.002-0.25% eU and 0.001-0.24% U and for the grab sample 0.60% eU and, in both analyses, 0.56% U; similar measurement and analysis of one grab sample from a highly radioactive zone on E side of river gave: 0.32% eU and, in both analyses, 0.30% U: 817; uranium-bearing sandstone of upper part of Catskill formation of Devonian age occurs along 300 ft. of outcrop on W side of Lehigh River and outcrops on E side of river about 500 ft. away; assays of 13 samples from western outcrop weighted against length of sample averaged 0.053% U and a selected sample from eastern outcrop showed 0.30% U; both kasolite and uranophane occurred sparingly in this locality: 995.

PENNSYLVANIA (contd.)

Carbon County (contd.)
Liebigite Occurrences
Jim Thorpe (formerly Mauch Chunk)
Mount Pisgah: carnotite known here since 1874 on property now owned by Lehigh Coal and Navigation Co.; uranium is found in basal sandstone and conglomerate member of Pottsville formation; uranium minerals identified here include carnotite, tyuyamunite, liebigite, uranophane, and a black radioactive material in the matrix of the rock; minerals occur as coatings on fracture surfaces and slickenside surfaces and as incrustations on loosely cemented quartz pebbles in conglomerate and some uranium occurs in cracks in pebbles, in calcite cement filling cracks, and in black material in matrix of rock; some secondary mineralization occurs on surfaces of broken rock: 817; carnotite discovered here in 1874 on property now owned by Lehigh Coal and Navigation Co.; sporadic bright yellow surface coatings are visible on cliff face of basal Pottsville conglomerate over a distance of a half-mile along U. S. Highway 309; U.S.A.E.C. geologists investigated occurrence early in 1952 and U.S.G.S. geologists also studied area; this interest led company to carry out an extensive program of exploratory mining and diamond drilling; minerals found there in recent geologic studies include carnotite, tyuyamunite, and an unknown uranium mineral, possibly uraninite, as well as uranium carbonate efflorescences including some schroeckingerite,

PENNSYLVANIA (contd.)

Carbon County (contd.)
Liebigite Occurrences
Jim Thorpe (formerly Mauch Chunk)
Mount Pisgah:
an unverified as yet but reported kasolite occurrence, and liebigite, andersonite, and uranophane; origin: 867.
Meta-autunite Occurrences
Jim Thorpe (formerly Mauch Chunk)
Mauch Chunk ridge ½ mi. S of Jim Thorpe (formerly Mauch Chunk) on S side of U. S. Highway 309; uranium minerals in nearly vertical Catskill beds of upper Devonian age; meta-autunite in flaky aggregates and plates on fracture surfaces in sandstone and some uranium mineralization associated with carbonized plant remains; this occurrence was noted first by F. A. McKeown of U.S.G.S. in 1949 while making a radiometric survey of the area and, more recently, carnotite has been found below the highway in the same general area along the same stratigraphic horizon; mineralogical studies revealed presence of meta-uranocircite and meta-torbernite as well as meta-autunite; origin: 867.
Meta-torbernite Occurrences
Jim Thorpe (formerly Mauch Chunk)
Mauch Chunk ridge ½ mi. S of Jim Thorpe (formerly Mauch Chunk) on S side of U. S. Highway 309: uranium minerals in nearly vertical Catskill beds of upper Devonian age; meta-autunite in flaky aggregates and plates on fracture surfaces in sandstone and some uranium mineralization associated with carbonized plant remains; this occurrence was noted first by F. A. McKeown of the U.S.G.S. in 1949 while making a radiometric survey of the area and, more recently,

PENNSYLVANIA (contd.)

Carbon County (contd.)
Meta-torbernite Occurrences
Jim Thorpe (formerly Mauch Chunk)
Mauch Chunk ridge:
carnotite has been found below the highway in the same general area along the same stratigraphic horizon; mineralogical studies revealed presence of meta-uranocircite, and meta-torbernite as well as meta-autunite; origin: 867.
Meta-uranocircite Occurrences
Jim Thorpe (formerly Mauch Chunk)
Mauch Chunk ridge ½ mi. S of Jim Thorpe (formerly Mauch Chunk) on S side of U. S. Highway 309: uranium minerals in nearly vertical Catskill beds of upper Devonian age; meta-autunite in flaky aggregates and plates on fracture surfaces in sandstone and some uranium mineralization associated with carbonized plant remains; this occurrence was noted first by F. A. McKeown of U.S.G.S. in 1949 while making a radiometric survey of the area and, more recently, carnotite has been found below the highway in the same general area along the same stratigraphic horizon; mineralogical studies revealed presence of meta-uranocircite and meta-torbernite as well as meta-autunite; origin: 867.
Pitchblende Occurrences
Jim Thorpe (formerly Mauch Chunk): pitchblende and carnotite in sandy lenses in Pottsville conglomerate in deposits being explored by Lehigh Coal and Navigation Co.: 765; first uranium producing mine in east on edge of Pocono Mountains; Lehigh Coal and Navigation Co. has driven an adit into the orebody embedded in

PENNSYLVANIA (contd.)

Carbon County (contd.)
Pitchblende Occurrences
Jim Thorpe (formerly Mauch Chunk): Pottsville conglomerate located in base of coal measures and containing carnotite and a substance resembling pitchblende; U.S.A.E.C. will take all the uranium produced and stockpile it since there are no uranium mills in eastern United States; presence of carnotite has been recognized here since early 1800's: 1084.
Radioactive Clay
Hometown, 2 mi. E of, on Pennsylvania Highway 45: layer 1-inch thick of organic-rich clay and sand on top of gravel is radioactive with a radioactivity of 0.02% eU although one sample showed only 0.006% eU; overlies red shale of Mauch Chunk formation and Pottsville conglomerate float is abundant; source of radioactive elements, which appear to have been absorbed by the top soil, not known: 994.
Radioactive Coal
Eastern Middle Field
Hazelton quadrangle
Strip mine, 0.4 mi. E of road junction at Tresckow, 0.1 mi. S of all-weather road: radioactivity reported for shale and coal in Buck Mountain coal, starting with uppermost: dark-gray shale, 0.001% eU; and two bright coals separated by non-radioactive dark-gray shale, upper coal less than 0.001% eU and lower coal, 0.001% eU: 1011; radioactivity of Buck Mountain coal, 0.001% eU: 994.

PENNSYLVANIA (contd.)

Carbon County (contd.)
Radioactive Coal
Southern Field
Nesquehoning quadrangle
Abandoned strip pit in Buck Mountain coal, 1.5 mi. SE of center of Nesquehoning on S side of unimproved road: radioactivity reported for claystone and coal, starting with uppermost: a very carbonaceous claystone and a bone coal, both 0.001% eU; non-radioactive moderately bright coal, bone coal, and bright coal; bone coal, 0.001% eU; four very bright coals, all less than 0.001% eU; bone coal, 0.001% eU; two bright coals separated by unsampled bone coal, taken together, less than 0.001% eU; and bone coal, less than 0.001% eU: 1011.
Abandoned strip pit in unidentified coal, 0.9 mi. SE of center of Nesquehoning on S side of unimproved road: radioactivity reported for claystone, coal, and shale, starting with uppermost: stigmarian claystone, 0.001% eU; bright sheared coal, less than 0.001% eU; shale with pyrite lenses, 0.002% eU; a bright coal separated from two other bright coals by a bone coal, all four less than 0.001% eU; bony coal, 0.001% eU; and dark-gray carbonaceous shale, 0.002% eU: 1011.

PENNSYLVANIA (contd.)

Carbon County (contd.)
Radioactive Coal
Southern Field
Nesquehoning quadrangle
Road cut exposing Primrose(?) coal, 0.8 mi. S of Nesquehoning on W side of U. S. Highway 209: radioactivity reported for coal, shale, and claystone, starting with uppermost: a dark-gray, thin-bedded shale and a bone and bony coal, both 0.001% eU; two very bright coals separated by a bone coal, all three less than 0.001% eU; bone coal, 0.001% eU; and stigmarian claystone, 0.002% eU: 1011.
Radioactive Rocks
Eastern Middle Field
Hazelton quadrangle
Strip mine, 0.4 mi. E of road junction at Tresckow, 0.1 mi. S of all-weather road: radioactivity reported for shale and coal in Buck Mountain coal, starting with uppermost: dark-gray shale, 0.001% eU; and two bright coals separated by non-radioactive dark-gray shale, upper coal less than 0.001% eU and lower coal, 0.001% eU: 1011.
Southern Field
Nesquehoning quadrangle
Abandoned strip pit in Buck Mountain coal, 1.5 mi. SE of center of Nesquehoning on S side of unimproved road: radioactivity reported for claystone and coal, starting with uppermost: a very carbonaceous claystone and a bone coal both 0.001% eU; non-radioactive moderately bright coal, bone coal, and bright coal; bone coal, 0.001% eU; four very bright coals, all less than 0.001% eU; bone coal, 0.001%

PENNSYLVANIA (contd.)

Carbon County (contd.)
Radioactive Rocks
Southern Field
Nesquehoning quadrangle
Abandoned strip pit in Buck Mountain coal: eU; two bright coals separated by unsampled bone coal, taken together less than 0.001% eU; and bone coal, less than 0.001% eU: 1011.
Road cut exposing Primrose(?) coal, 0.8 mi. S of Nesquehoning on W side of U. S. Highway 209: radioactivity reported for coal, shale, and claystone, starting with uppermost: a dark-gray, thin-bedded shale and a bone and bony coal, both 0.001% eU; two very bright coals separated by a bone coal, all three less than 0.001% eU; bone coal, 0.001% eU; and stigmarian claystone, 0.002% eU: 1011.
Sandstone, Uranium-bearing
Jim Thorpe (formerly Mauch Chunk)
Butcher Hollow, 4 mi. N of Jim Thorpe (formerly Mauch Chunk): uranium-bearing sandstone in upper part of Catskill formation of Devonian age occurs along 30 ft. of outcrop on W side of Lehigh River and in talus on E side of river about 500 ft.; average U content of four samples representing about 2 ft. of six-foot interval of rock, 0.016%, and of selected rock specimen from talus, 0.016%: 995.

PENNSYLVANIA (contd.)

Carbon County (contd.)
Sandstone, Uranium-bearing
Jim Thorpe (formerly Mauch Chunk)
Penn Haven Junction, 0.4 mi. S of: uranium-bearing sandstone of upper part of Catskill formation of Devonian age occurs along 300 ft. of outcrop on W side of Lehigh River and crops out on E side of river about 500 ft. away; assays of 13 samples from western outcrop weighted against length of sample averaged 0.053% U and a selected sample from eastern outcrop showed 0.30% U; both kasolite and uranophane occurred sparingly in this locality: 995.
Schroeckingerite Occurrences
Jim Thorpe (formerly Mauch Chunk): Pottsville conglomerate on route U. S. 309 contains carnotite probably also zippeite, and thin fluorescent coating of schroeckingerite: 1078; uranothallite, not schroeckingerite, found in carnotite locality; mineral identified by X-ray analysis by U. S. government: 1087.
Jim Thorpe (formerly Mauch Chunk)
Mount Pisgah: carnotite discovered here in 1874 on property now owned by Lehigh Coal and Navigation Co.; sporadic bright yellow surface coatings are visible on cliff face on basal Pottsville conglomerate over a distance of a half-mile along U. S. Highway 309; U.S.A.E.C. geologists investigated occurrence early in 1952 and U.S.G.S geologists also studied area; this interest led company to carry out an extensive program of exploratory mining and diamond drilling; minerals found there in recent geologic studies include carnotite, tyuyamunite, and an unknown uranium mineral, possibly uraninite, as well as

PENNSYLVANIA (contd.)

Carbon County (contd.)

Schroeckingerite Occurrences

Jim Thorpe (formerly Mauch Chunk)

Mount Pisgah: uranium carbonate efflorescences including some schroeckingerite, an unverified as yet but reported kasolite occurrence, and liebigite, andersonite, and uranophane; origin: 867.

~~Thorianite Occurrences~~

~~Williams (formerly Sherrer) quarry N of Easton: thorianite, chemical analysis gave 4.44 UO_2, 33.15 UO_3, 38.47 ThO_2; calculated geologic age, 790 m.y.: 1012.~~

Thorium Occurrences

~~Easton, north of: small segregations resembling clarkeite or gummite in serpentine; chemical analysis gave 42.70 U_3O_8 or 36.21 U and 25.06 ThO_2 or 22.03 Th; calculated geologic age, 590 m.y.: 1012.~~

Jim Thorpe (formerly Mauch Chunk): pitchblende and carnotite in sandy lenses in Pottsville conglomerate in deposits being explored by Lehigh Coal and Navigation Co.: 765.

~~Williams (formerly Sherrer) quarry N of Easton: thorianite, chemical analysis gave 4.44 UO_2, 33.15 UO_3, 38.47 ThO_2; calculated geologic age, 790 m.y.: 1012.~~

Torbernite Occurrences

Jim Thorpe (formerly Mauch Chunk)

Mount Pisgah: carnotite in Pottsville conglomerate, torbernite(?): 766.

PENNSYLVANIA (contd.)

Carbon County (contd.)

Tyuyamunite Occurrences

Jim Thorpe (formerly Mauch Chunk)

Mount Pisgah: carnotite discovered here in 1874 on property now owned by Lehigh Coal and Navigation Co.; sporadic bright yellow surface coatings are visible on cliff face of basal Pottsville conglomerate over a distance of a half-mile along U. S. Highway 309; U.S.A.E.C. geologists investigated occurrence early in 1952 and U.S.G.S. geologists also studied area; this interest led company to carry out an extensive program of exploratory mining and diamond drilling; minerals found there in recent geologic studies include carnotite, tyuyamunite, and an unknown uranium mineral, possibly uraninite, as well as uranium carbonate efflorescences including some schroeckingerite, an unverified as yet but reported kasolite occurrence, and liebigite, andersonite, and uranophane; origin: 867; carnotite known here since 1874 on property now owned by Lehigh Coal and Navigation Co.; uranium is found in basal sandstone and conglomerate member of Pottsville formation; uranium minerals identified here include carnotite, tyuyamunite, liebigite, uranophane, and a black radioactive material in the matrix of the rock; minerals occur as coatings on fracture surfaces and slickenside surfaces and as incrustations on loosely cemented quartz pebbles in conglomerate and some uranium occurs in cracks in pebbles, in calcite cement filling cracks, and in black material in matrix of rock; some secondary mineralization occurs on surfaces of

PENNSYLVANIA (contd.)

Carbon County (contd.)
Tyuyamunite Occurrences
Jim Thorpe (formerly Mauch Chunk)
Mount Pisgah:
broken rock: 817; uranium occurrence known for many years extending along U. S. Highway 309 for about 2,700 ft., as carnotite in Pottsville conglomerate and sandstone; property owned by Lehigh Coal and Navigation Co.; which has done considerable exploration work; investigations also made by U.S.A.E.C. and U.S.G.S.; carnotite, only U mineral known here until 1952, is the most conspicuous mineral occurring in the conglomerate lenses in fractures, in spaces between pebbles, and in fractures within pebbles, and in sandstone, only, in fractures, especially shears; it is associated with tyuyamunite; a black, radioactive mineral, possibly some form of uraninite, occurs disseminated through the dark sandstones and conglomerate and is highest in U_3O_8 when it contains a high percentage of carbonaceous material; where carbonaceous lenses are associated with shears having slickenside surfaces on which secondary yellow and green minerals are present, radioactivity is very high, while non-carbonaceous rocks cut by such shears exhibit negligible or no radioactivity; one or two fossil logs, exposed on outcrop, are associated with high concentrations of carnotite: 733; uranium concentration seems to be controlled here by lenses with a

PENNSYLVANIA (contd.)

Carbon County (contd.)
Tyuyamunite Occurrences
Jim Thorpe (formerly Mauch Chunk)
Mount Pisgah:
high percentage of carbonaceous material, and to a lesser degree, by fractures, of which most are parallel to the strata, so that the most radioactive rock bodies are lenticular and have their longest dimensions parallel to the strata; a few irregularly-shaped radioactive bodies develop when cross-cutting shears intersect favorable rock masses of irregular shape but these are the exception not the rule; radioactive lenses are confined almost entirely to the middle unit of the uranium-bearing member of the Pottsville formation; in a zone averaging 26 ft. in thickness as revealed by drilling; the lenses vary from a few inches to about 6 ft. in thickness and rarely exceed 20 ft. in length; radioactivity along the outcrop is pronounced, with several hundred counts per minute or higher, over a background of 30 to 40 counts, being recorded on a scintillometer over an aggregate distance of more than 500 ft., chemical analyses of representative samples from several lenses showed an average U_3O_8 content of 0.2-0.5%: 733.

PENNSYLVANIA (contd.)

Carbon County (contd.)
Uraninite Occurrences
Jim Thorpe (formerly Mauch Chunk)
Mount Pisgah: uranium occurrences known for many years, extending along U. S. Highway 309 for about 2,700 ft., as carnotite in Pottsville conglomerate and sandstone; property owned by Lehigh Coal and Navigation Co., which has done considerable exploration work; investigations also made by U.S.A.E.C. and U.S.G.S. carnotite, only U mineral known here until 1952, is the most conspicuous mineral occurring in the conglomerate lenses in fractures, in spaces between pebbles, and in fractures within pebbles, and in the sandstone, only in fractures, especially shears; it is associated with tyuyamunite; a black radioactive mineral, possibly some form of uraninite, occurs disseminated through the dark sandstones and conglomerates and is highest in U_3O_8 when it contains a high percentage of carbonaceous material; where carbonaceous lenses are associated with shears having slickenside surfaces on which secondary yellow and green minerals are present, radioactivity is very high, while non-carbonaceous rocks cut by such shears exhibit negligible or no radioactivity; one or two fossil logs, exposed on outcrop, are associated with high concentrations of carnotite: 733; uranium concentration seems to be controlled here by lenses with a high percentage of carbonaceous material and, to a lesser degree, by fractures, of which

PENNSYLVANIA (contd.)

Carbon County (contd.)
Uraninite Occurrences
Jim Thorpe (formerly Mauch Chunk)
Mount Pisgah:
most are parallel to the strata, so that the most radioactive rock bodies are lenticular and have their longest dimensions parallel to the strata; a few irregularly-shaped radioactive bodies develop when cross-cutting shears intersect favorable rock masses of irregular shape but these are the exception not the rule; radioactive lenses are confined almost entirely to the middle unit of the uranium-bearing member of the Pottsville formation; in a zone averaging 26 ft. in thickness as revealed by drilling; the lenses vary from a few inches to about 6 ft. in thickness and rarely exceed 20 ft. in length; radioactivity along the outcrop is pronounced, with several hundred counts per minute or higher, over a background of 30 to 40 counts being recorded on a scintillometer over an aggregate distance of more than 500 ft.; chemical analyses of representative samples from several lenses showed an average U_3O_8 content of 0.2-0.5%: 733.
Mount Pisgah, roadcut on Pennsylvania Highway 29-209 W of town on N flank of: uranium deposit in basal Pennsylvania Pottsville formation, a highly siliceous dark gray quartz conglomerate; an irregular but conspicuous yellow coating of carnotite and other secondary uranium minerals occurs for 2,000 ft. and a black uranium oxide, probably uraninite, occurs below the weathered surface; detailed sampling shows

PENNSYLVANIA (contd.)

Carbon County (contd.)
Uraninite Occurrences
Jim Thorpe (formerly Mauch Chunk)
Mount Pisgah, roadcut on Pennsylvania Highway 29-209 W of town on N flank of: that U concentrations cut slightly across the bedding down dip, perhaps controlled by jointing, and distribution along the strike is irregular with the uranium-bearing material forming shoots rather than tabular sheets; in the main stope, a conspicuous fault forms the back and the long direction of the ore shoot parallels the slickensides; occurrence has been known since 1874 and is now being developed by the Lehigh Coal and Navigation Co.: 1005.

Uranium Development
Jim Thorpe (formerly Mauch Chunk): uranium deposit being explored by Lehigh Coal and Navigation Co.; after extensive core drilling program, 400 tons of ore have been removed in further exploration; tunneling operations undertaken to determine extent of one major orebody located so far; initial analyses indicate average grade of 0.20% U_3O_8 with relatively high lime content; effort being made to determine extent of uranium reserves; U.S.A.E.C. stockpiling the ore at present: 1081.

PENNSYLVANIA (contd.)

Carbon County (contd.)
Uranium Exploration
Jim Thorpe (formerly Mauch Chunk): uranium deposit being explored by Lehigh Coal and Navigation Co.; after extensive core drilling program, 400 tons of ore have been removed in further exploration; tunneling operations undertaken to determine extent of one major orebody located so far; initial analyses indicate average grade of 0.20% U_3O_8 with relatively high lime content; effort being made to determine extent of uranium reserves; U.S.A.E.C. stockpiling the ore at present: 1081; pitchblende and carnotite in sandy lenses in Pottsville conglomerate in deposits being explored by Lehigh Coal and Navigation Co.: 765; uranium known, for the last 30 years, to occur on lands of Lehigh Coal and Navigation Co. but probably only in very thin veins or sections from 1/8 to 3/8 inch thick and almost vertical; company to diamond drill to get more information about deposit; Geiger counter surveys made on property by Lehigh University and Federal Government geologists: 1059; shaft sunk by Lehigh Coal and Navigation Co. for further examination of uranium mineralization, known since 1874 and identified as carnotite in 1908: 1076; geology and structure of uranium deposits; mineralogy; stratigraphy; completed and proposed exploration work, consideration of the presence of carbonaceous material in uranium deposits for use as a possible criterion for indicating "favorable ground" in search for other uranium deposits, as in Colorado Plateau; exploration work and reconnaissance by U.S.G.S. resulting in discovery of new

PENNSYLVANIA (contd.)

Carbon County (contd.)
Uranium Exploration
Jim Thorpe (formerly Mauch Chunk): deposits here: 817; airborne radiometric reconnaissance by Safair Flying Services, Inc., for U.S.A.E.C. to determine if further exploration of carnotite deposit was warranted: 1076; U.S.A.E.C. airborne radioactivity survey to determine extent of uranium mineralization in ground in this area; presence of uranium mineral known since 1874 but not studied until 1908 when identified as carnotite; additional occurrences, of which commercial value and size are unknown, reported recently and survey will help determine whether further exploration is warranted: 1075.
Jim Thorpe (formerly Mauch Chunk)
Butcher Hollow, 4 mi. N of Jim Thorpe, in gorge of Lehigh River at an approximate elevation of 710 ft. near level of Lehigh Valley Railroad tracks on W side of river: uranium deposit on land owned by Lehigh Coal and Navigation Co. on W side of river and by the Commonwealth of Pennsylvania on E side of river; no development work has been done yet; uranium occurs in upper part of Catskill formation on S limb of a local anticline near crest of Broad Mountain anticline; uranium-bearing rock occurs in talus on E side of river at approximately the same elevation and stratigraphic position; no uranium minerals have been identified; radioactivity measurement and two chemical analyses of three chip samples from W side of river

PENNSYLVANIA (contd.)

Carbon County (contd.)
Uranium Exploration
Jim Thorpe (formerly Mauch Chunk)
Butcher Hollow: gave the following results: 0.004% eU and 0.002 and 0.003% U; 0.048 and 0.047% eU and 0.040 and 0.038% U; and 0.026 and 0.027% eU and, in both analyses, 0.022% U; similar studies on material from talus deposit on E side of river gave the following results: for a chip sample, 0.004% eU and 0.002 and 0.001% U; and for a grab sample, 0.063% eU and 0.060 and 0.055% U: 817.
Mauch Chunk ridge, in roadcut along U. S. Highway 309 and along Central Railroad of New Jersey tracks: uranium deposit owned partly by Lehigh Coal and Navigation Co. and partly by Stuart Evans; deposit was prospected by core drilling in 1953 and occurs in uraniferous sandstone in the Cherry Ridge red beds of the Catskill formation; the uranium-bearing rock occurs discontinuously for about a mile along the strike and 700 ft. along the dip of the Catskill formation; autunite, kasolite, and uranophane occur on joint surfaces and in cracks in the rock but are not conspicuous on the outcrops; the most radioactive part of the formation is an unidentified black or gray material disseminated in the matrix; radioactivity measurement and two chemical analyses of three grab samples gave the following results: 0.034% eU and 0.030 and 0.031% U; 0.017% eU and 0.012 and 0.011% U; and 0.10% eU and in both analyses, 0.13% U: 817.

PENNSYLVANIA (contd.)

Carbon County (contd.)
Uranium Exploration
Jim Thorpe (formerly Mauch Chunk)
Mount Pisgah: carnotite known here since 1874 on property now owned by Lehigh Coal and Navigation Co.; uranium is found in basal sandstone and conglomerate member of Pottsville formation; uranium minerals identified here include carnotite, tyuyamunite, liebigite, uranophane, and a black radioactive material in the matrix of the rock; minerals occur as coatings on fracture surfaces and slickenside surfaces and as incrustations on loosely cemented quartz pebbles in conglomerate and some uranium occurs in cracks in pebbles in calcite cement filling cracks, and in black material in matrix of rock; some secondary mineralization occurs on surfaces of broken rock: 817.
Penn Haven Junction, 0.4 mi. S of station, on both sides of Lehigh River: uranium deposit on land owned by Lehigh Coal and Navigation Co. on W side of river and by the Commonwealth of Pennsylvania on E side of river; no development work has been done yet; uranium-bearing rock at an elevation of 720 ft. in upper part of Catskill formation in a local anticline on N limb of Broad Mountain anticline; mineralized rock is gray to greenish-gray, medium-grained graywacke; on E side of river, rock occurs along an abandoned

PENNSYLVANIA (contd.)

Carbon County (contd.)
Uranium Exploration
Jim Thorpe (formerly Mauch Chunk)
Penn Haven Junction: railroad bed and is less radioactive than that on W side, so no detailed sampling was done here; on the W side of river, the rock outcrops for about 300 ft. along the Lehigh Valley railroad tracks in a zone between the track level and 10 ft. above it; kasolite and an unidentified yellow fluorescent mineral, probably uranophane, occur sparingly as flakes and incrustations on bedding-plane and fracture surfaces and uranium is also disseminated in the rock; radioactivity measurement and two chemical analyses of 12 chip samples and 1 grab sample gave the following results: for the 12 chip samples, a range of 0.002-0.25% eU and 0.001-0.24% U and for the grab sample 0.60% eU and, in both analyses, 0.56% U; similar measurement and analysis of one grab sample from a highly radioactive zone on E side of river gave: 0.32% eU and, in both analyses, 0.30% U: 817.
Geophysical Exploration (Airborne)
Jim Thorpe (formerly Mauch Chunk): airborne radiometric reconnaissance by Safair Flying Services, Inc., for U.S.A.E.C. to determine if further exploration of carnotite deposits was warranted: 1076; U.S.A.E.C. airborne radioactivity survey to determine extent of uranium mineralization in ground in this area; presence of uranium mineral known since 1874 but not studied until 1908 when identified as carnotite; additional occurrences, of which commercial value and size are

PENNSYLVANIA (contd.)

Carbon County (contd.)
Uranium Exploration
Geophysical Exploration (Airborne)
Jim Thorpe (formerly Mauch Chunk):
unknown, reported recently and survey will help determine whether further exploration is warranted: 1075.

Uranium Occurrences
~~Easton, north of: small segregations resembling clarkeite or gummite in serpentine; chemical analysis gave 42.70 U_3O_8 or 36.21 U and 25.06 ThO_2 or 22.03 Th; calculated geologic age, 590 m.y.: 1012.~~
Jim Thorpe (formerly Mauch Chunk): autunite as pale yellowish incrustation on Pottsville conglomerate and associated with carnotite at the occurrence on the S side of U. S. Highway 209 about 1 mi. W of C.R.R.N.J. station: 1042; small scales of autunite in a conglomerate: 762; earliest discovery of carnotite in United States reported here in 1874 in the conglomerate of Pottsville formation; two other discoveries were made as recently as 1951 in same area, one in Pottsville conglomerate and the other in Pocono sandstone; exploration work has revealed several hundred feet of mineralization of which sections are of commercial grade; in addition to the original carnotite, considerable autunite and an unidentified black radioactive mineral have been reported from the area: 883; carnotite was first discovered in the anthracite region in 1902 within 7 mi. of point on Summit Hill where coal was first discovered in the county in 1791: 917; carnotite

PENNSYLVANIA (contd.)

Carbon County (contd.)
Uranium Occurrences
Jim Thorpe (formerly Mauch Chunk): occurs on ledge of conglomerate rocks which form transition strata between Mauch Chunk red shale and Pottsville conglomerate at a ½ mi. W of bridge crossing Lehigh River to East Mauch Chunk and on S side of Eastern Pennsylvania R. R. where R. R. cut was made by blasting away the mountain side: 917; carnotite appears as green and canary yellow baubs or splashes on rock and impregnates foreign matter deposited in crevices, which are 1-2 ft. long and not more than 1 inch wide: 917; rock must contain 2% carnotite in order to be worked profitably and should be drilled to see if it contains enough ore to work: 917; carnotite: 20, 46; carnotite in conglomerate: 444; carnotite as yellow scattered streaks and patches on coarse grained Pottsville conglomerate outcropping along U. S. Highway 209 a few hundred feet NW of the Lehigh Coal and Navigation Co. to put a pilot uranium mine into operation to determine if large scale production is feasible since ore is of good quality: 1077; carnotite deposits in sandstone, similar to Colorado Plateau, on land of Lehigh Coal and Navigation Co. to be mined; first contract for purchase of uranium ore in eastern United States being negotiated between U.S.A.E.C. and company: 1083; carnotite in Pottsville conglomerate on side of Mount Pisgah; possible origins suggested: 874; carnotite in sandstone of Pottsville formation of Pennsylvanian age and Willards Cherry Ridge red beds of Upper Devonian age: 509; a supposed autunite is carnotite, similar

PENNSYLVANIA (contd.)

Carbon County (contd.)
Uranium Occurrences
Jim Thorpe (formerly Mauch Chunk):
to Colorado ore, found on top of Mauch Chunk red shale in layers of conglomerate about 1 mi. from town and W of Lehigh River; probably was extracted from intercalated lenses of black shale and graywacke and may have same origin as ore in western United States: 1015; pitchblende and carnotite in sandy lenses in Pottsville conglomerate in deposits being explored by Lehigh Coal and Navigation Co.: 765; uranothallite, not schroeckingerite, found in carnotite locality; mineral identified by X-ray analysis by U. S. government: 1087; Pottsville conglomerate on route U. S. 309 contains carnotite probably also zippeite, and thin fluorescent coating of schroeckingerite: 1078; radioactive minerals present and, when given, intensity of radiograph on photographic plate: autunite, crystalline scales, moderately active; uranochre(?), thin coating, moderately active: 1018; uranium reported on property of Lehigh Coal and Navigation Co.: 1102; uranium known, for the last 30 years, to occur on lands of Lehigh Coal and Navigation Co. but probably only in very thin veins or sections from 1/8 to 3/8 inch thick and almost vertical; company to diamond drill to get more information about deposit; Geiger counter surveys made on property by Lehigh University and Federal Government geologists: 1059; uranium occurrences in the Pottsville

PENNSYLVANIA (contd.)

Carbon County (contd.)
Uranium Occurrences
Jim Thorpe (formerly Mauch Chunk):
formation of Pennsylvanian age and the Cherry Ridge member of the Catskill formation of Upper Devonian age: 841; uranium deposits being explored by Lehigh Coal and Navigation Co.; after extensive core drilling program, 400 tons of ore have been removed in further exploration; tunneling operations undertaken to determine extent of one major orebody located so far; initial analyses indicate average grade of 0.20% U_3O_8 with relatively high lime content; effort being made to determine extent of uranium reserves; U.S.A.E.C. stockpiling the ore at present: 1081; shaft sunk by Lehigh Coal and Navigation Co. for further examination of uranium mineralization, known since 1874 and identified as carnotite in 1908: 1076; uranium on Lehigh Coal and Navigation Co. property; small scale mining to be started in summer of 1954 involving only about 200-300 ft. uranium-bearing ore: 1085; geology and structure of uranium deposits; mineralogy; stratigraphy; completed and proposed exploration work; consideration of the presence of carbonaceous material in uranium deposits for use as a possible criterion for indicating "favorable ground" in search for other uranium deposits, as in Colorado Plateau; exploration work and reconnaissance by U.S.G.S. resulted in discovery of new deposits here: 817; map showing sandstone type deposits actively or formerly mined for uranium or potentially minable under June 1955 market conditions: 1110; airborne radiometric reconnaissance by Safair Flying Services,

PENNSYLVANIA (contd.)

Carbon County (contd.)
Uranium Occurrences
Jim Thorpe (formerly Mauch Chunk):
Inc., for U.S.A.E.C. to determine if further exploration of carnotite deposit was warranted: 1076; U.S.A.E.C. airborne radioactivity survey to determine extent of uranium mineralization in ground in this area; presence of uranium mineral known since 1874 but not studied until 1908 when identified as carnotite; additional occurrences, of which commercial value and size are unknown, reported recently and survey will help determine whether further exploration is warranted: 1075.
Jim Thorpe (formerly Mauch Chunk)
Butcher Hollow, 4 mi. N of Jim Thorpe, in gorge of Lehigh River at an approximate elevation of 710 ft. near level of Lehigh Valley Railroad tracks on W side of river: uranium deposit on land owned by Lehigh Coal and Navigation Co. on W side of river and by the Commonwealth of Pennsylvania on E side of river; no development work has been done yet; uranium occurs in upper part of Catskill formation on S limb of a local anticline near crest of Broad Mountain anticline; uranium-bearing rock occurs in talus on E side of river at approximately the same elevation and stratigraphic position; no uranium minerals have been identified; radioactivity measurement and two chemical analyses of three chip samples from W side of river gave the following results: 0.004% eU

PENNSYLVANIA (contd.)

Carbon County (contd.)
Uranium Occurrences
Jim Thorpe (formerly Mauch Chunk)
Butcher Hollow:
and 0.002 and 0.003% U; 0.048 and 0.047% eU and 0.040 and 0.038% U; and 0.026 and 0.027% eU and, in both analyses, 0.022% U; similar studies on material from talus deposit on E side of river gave the following results: for a chip sample, 0.004% eU and 0.002 and 0.001% U, and for a grab sample, 0.063% eU and 0.060 and 0.055% U: 817; uranium-bearing sandstone in upper part of Catskill formation of Devonian age occurs along 30 ft. of outcrop on W side of Lehigh River and in talus on E side of river about 500 ft.; average U content of four samples representing about 2 ft. of six-foot interval of rocks, 0.016% and of selected rock specimen from talus, 0.016%: 995.
First uranium producing mine in east on edge of Pocono Mountains: Lehigh Coal and Navigation Co. has driven an adit into the orebody embedded in Pottsville conglomerate located in base of coal measures and containing carnotite and a substance resembling pitchblende; U.S.A.E.C. will take all the uranium produced and stockpile it since there are no uranium mills in eastern United States; presence of carnotite has been recognized here since early 1800's: 1084.
Second uranium occurrence: found SE of the town in 1949 by F. A. McKeown of U.S.G.S.; deposit appeared to have commercial possibilities and a short period of production began in July 1954: 1005.

PENNSYLVANIA (contd.)

Carbon County (contd.)
Uranium Occurrences
Jim Thorpe (formerly Mauch Chunk)
Five other uranium prospects, known in this area, border the Pocono Plateau: four occur in artificial cuts and one is exposed along the bank of a steep valley and all are found in the fluviatile sandstone or graywacke of the Upper Devonian Catskill formation; four are characterized by small pods of uraniferous material; the fifth is of possible commercial interest and has uranium localized along the limbs near the crest of a small anticline with mineralization essentially parallel to the bedding, associated pyrite and galena in the more strongly radioactive portions, and a wedge-shaped zone assaying ore grade across mining widths for about 60 ft. with the dip carrying the strata out of sight at the thickest part of the wedge: 1005.
Mauch Chunk ridge, in roadcut along U. S. Highway 309 and along Central Railroad of New Jersey tracks: uranium deposit owned partly by Lehigh Coal and Navigation Co. and partly by Stuart Evans; deposit was prospected by core drilling in 1953 and occurs in uraniferous sandstone in the Cherry Ridge red beds of the Catskill formation; the uranium-bearing rock occurs discontinuously for about a mile along the strike and 700 ft. along the dip of the Catskill formation; autunite, kasolite, and uranophane occur on joint surfaces and in cracks in the rock but are

PENNSYLVANIA (contd.)

Carbon County (contd.)
Uranium Occurrences
Jim Thorpe (formerly Mauch Chunk)
Mauch Chunk ridge:
not conspicuous on the outcrops; the most radioactive part of the formation is an unidentified black or gray material disseminated in the matrix; radioactivity measurement and two chemical analyses of three grab samples gave the following results: 0.034% eU and 0.030 and 0.031% U; 0.017% eU and 0.012 and 0.011% U; and 0.10% eU and, in both analyses, 0.13% U: 817.
Mauch Chunk ridge, at E end in gap cut by Lehigh River between it and Bear Mountain: uranium occurrences found here in 1949 by U.S.G.S. geologists during a radiometric survey along U. S. Highway 309; uranium-bearing strata are olive-gray sandstones at the bottom of a thick series of dominantly red (grayish-red) sandstone, pebbly sandstones, siltstones, and shales of the Catskill continental facies, and this series may constitute the whole of the Cherry Ridge group of beds; stratigraphically, the uranium horizon is 4,150 ft. below the base of the Pottsville and 2,000 ft. below the Mauch Chunk shale; the radioactive zone is 6-10 ft. wide and traceable up the cliff face for 30 ft.; there may be a relationship between the presence of poorly preserved plant fossils, in the zone of highest activity, and the highest concentration of visible uranium minerals; meta-autunite and other uranium minerals were found here; similar deposit was found about 3/4 mi. further E along the Central Railroad of New Jersey, where a gray sandstone contained olive-

PENNSYLVANIA (contd.)

Carbon County (contd.)
Uranium Occurrences
Jim Thorpe (formerly Mauch Chunk)
Mauch Chunk ridge:
gray mud pellets and several thin clay seams, and conspicuous yellow and apple-green coatings of carnotite and other uranium minerals on bedding and closely spaced fracture surfaces; this zone is approximately 3 ft. wide and the entire radioactive zone, measured stratigraphically is nearly 20 ft. wide; scintillometer readings at three locations between the two occurrences were significantly high although no uranium minerals were visible at the outcrops: 733.

Mauch Chunk ridge ½ mi. S of Jim Thorpe (formerly Mauch Chunk) on S side of U. S. Highway 309: uranium minerals in nearly vertical Catskill beds of upper Devonian age; meta-autunite in flaky aggregates and plates on fracture surfaces in sandstone and some uranium mineralization associated with carbonized plant remains; this occurrence was noted first by F. A. McKeown of U.S.G.S. in 1949 while making a radiometric survey of the area and, more recently, carnotite has been found below the highway in the same general area along the same stratigraphic horizon; mineralogical studies revealed presence of meta-uranocircite and meta torbernite as well as meta-autunite; origin: 867.

PENNSYLVANIA (contd.)

Carbon County (contd.)
Uranium Occurrences
Jim Thorpe (formerly Mauch Chunk)
Mount Pisgah: carnotite: 7, 78, 82, 635; carnotite in Pottsville conglomerate, torbernite (?): 766; carnotite known since 1874 in Pottsville conglomerate: 1098; carnotite in 40-ft. layer of coarse-grained conglomerate lying near the base of the Pottsville formation (Pennsylvanian) and just above the red Mauch Chunk shale (Mississippian) in strata dipping 30-60° S. into the mountain: 1017; carnotite discovered here in 1874 on property now owned by Lehigh Coal and Navigation Co.; sporadic bright yellow surface coatings are visible on cliff face of basal Pottsville conglomerate over a distance of a half-mile along U. S. Highway 309; U.S.A.E.C. geologists investigated occurrence early in 1952 and U.S.G.S. geologists also studied area; this interest led company to carry out an extensive program of exploratory mining and diamond drilling; minerals found there in recent geologic studies include carnotite, tyuyamunite, and an unknown uranium mineral, possibly uraninite, as well as uranium carbonate efflorescences including some schroeckingerite, an unverified as yet but reported kasolite occurrence, and liebigite, andersonite, and uranophane; origin: 867; carnotite known here since 1874 on property now owned by Lehigh Coal and Navigation Co.; uranium is found in basal sandstone and conglomerate member of Pottsville formation; uranium minerals identified here include carnotite, tyuyamunite, liebigite,

PENNSYLVANIA (contd.)

Carbon County (contd.)
Uranium Occurrences
Jim Thorpe (formerly Mauch Chunk)
Mount Pisgah:
uranophane, and a black radioactive material in the matrix of the rock; minerals occur as coatings on fracture surfaces and slickenside surfaces and as incrustations on loosely cemented quartz pebbles in conglomerate and some uranium occurs in cracks in pebbles, in calcite cement filling cracks, and in black material in matrix of rock; some secondary mineralization occurs on surfaces of broken rock: 817; carnotite orebodies are usually only a few inches in diameter except for one pocket, near the E end of the cut, which is 10 ft. wide; their extent into the mountain is unknown but probably does not go below groundwater level and may be restricted to a very shallow zone, since the carnotite evidently was deposited by circulating surface waters: 1017; carnotite occurs thoroughly but unevenly distributed throughout the conglomerate as filling in openings and in cracks in pebbles or coatings on the slickenside surfaces in the harder quartzitic type conglomerate but, for the most part, as a replacement of the calcareous cement of certain parts of the conglomerate forming bodies or pockets irregular in size and shape: 1017; chemical composition of carnotite: two chemical analyses for uranium and vanadium by separation by nitric acid evaporation method and weighing as oxides gave:

PENNSYLVANIA (contd.)

Carbon County (contd.)
Uranium Occurrences
Jim Thorpe (formerly Mauch Chunk)
Mount Pisgah:
1) 23.8 UO_3 and 7.2 V_2O_5; and 2) 21.11 UO_3 and 9.80 V_2O_5; and after removal of insoluble matter, water, and iron oxide gave, respectively, 69.8 UO_3 and 21.1 V_2O_5, and 68.99 UO_3 and 21.73 V_2O_5; a theoretical composition of potassio-carnotite on a water-free basis gave 67.64 UO_3 and 21.34 V_2O_5: 1017; an analysis of a small specimen of carnotite-bearing rock gave 4.4% uranium oxide but this was a rich sample and probably very little material runs over 1%: 1017; commercial value of deposit: 1017; geology: 1017; history of deposit; uranium first reported there in 1874 but not identified as carnotite until 1908: 1017; origin of carnotite; distintegration of Precambrian and early Paleozoic crystalline rocks, commonly carrying uranium and vanadium minerals, which previously surrounded this region, and precipitation of minerals carrying the heavier metals from groundwater in the "black sand" lenses because of their having a higher specific gravity than the quartz which makes up most of the sediments: 1017; origin; in its present form, the carnotite was deposited by circulating waters but its original source in the formation was probably the lenses of black shale, which owes its color to the presence of very finely divided hornblende, biotite, and similar dark minerals and not to carbon; uranium may have been derived from metamorphic rocks of the New York-Pennsylvania Highlands, which contain radio-

PENNSYLVANIA (contd.)

Carbon County (contd.)
Uranium Occurrences
Jim Thorpe (formerly Mauch Chunk)
Mount Pisgah:
active minerals, and then accumulated in the fine black sand lenses with the vanadium; some pebbles in the conglomerate may contain uranium but evidence of this has not been found so far; development of the carnotite deposits appears to have been made possible by mechanical concentration of uranium and vanadium minerals, originally distributed in large bodies of crystalline rocks, brought about by the sudden change from a dry to a moist climate, a similar origin may explain the presence of carnotite in rocks of Colorado and Utah and also the frequent association of uranium and vanadium with coal: 1016; uranium occurrence known for many years, extending along U. S. Highway 309 for about 2,700 ft., as carnotite in Pottsville conglomerate and sandstone; property owned by Lehigh Coal and Navigation Co., which has done considerable exploration work; investigations also made by U.S.A.E.C. and U.S.G.S.; carnotite, only U mineral known here until 1952, is the most conspicuous mineral occurring in the conglomerate lenses in fractures, in spaces between pebbles, and in fractures within pebbles, and in the sandstone, only in fractures, especially shears; it is associated with tyuyamunite; a black, radioactive mineral, possibly some form of uraninite, occurs

PENNSYLVANIA (contd.)

Carbon County (contd.)
Uranium Occurrences
Jim Thorpe (formerly Mauch Chunk)
Mount Pisgah:
disseminated through the dark sandstones and conglomerates and is highest in U_3O_8 when it contains a high percentage of carbonaceous material; where carbonaceous lenses are associated with shears having slickenside surfaces on which secondary yellow and green minerals are present, radioactivity is very high, while non-carbonaceous rocks cut by such shears exhibit negligible or no radioactivity; one or two fossil logs, exposed on outcrop, are associated with high concentrations of carnotite: 733; uranium concentration seems to be controlled here by lenses with a high percentage of carbonaceous material and, to a lesser degree, by fractures, of which most are parallel to the strata, so that the most radioactive rock bodies are lenticular and have their longest dimensions parallel to the strata; a few irregularly-shaped radioactive bodies develop when cross-cutting shears intersect favorable rock masses of irregular shape but these are the exception not the rule; radioactive lenses are confined almost entirely to the middle unit of the uranium-bearing member of the Pottsville formation; in a zone averaging 26 ft. in thickness as revealed by drilling; the lenses vary from a few inches to about 6 ft. in thickness and rarely exceed 20 ft. in length; radioactivity along the outcrop is pronounced, with several hundred counts per minute or higher,

PENNSYLVANIA (contd.)

Carbon County (contd.)
Uranium Occurrences
Jim Thorpe (formerly Mauch Chunk)
Mount Pisgah:
over a background of 30 to 40 counts, being recorded on a scintillometer over an aggregate distance of more than 500 ft.; chemical analyses of representative samples from several lenses showed an average U_3O_8 content of 0.2-0.5%: 733.
Mount Pisgah, E end of: carnotite occurs in the synclinal mass of Mount Pisgah as scattered streaks and patches, very irregularly distributed, in the lower portion of the conglomerate of the Pottsville formation, conglomerate also contains lenses of non-carbonaceous black shale: 1016; mineral, called autunite but later identified as carnotite, first discovered in 1874; carnotite forms an amorphous to minutely crystalline bright yellow coating or impregnation in the conglomerate and often penetrates the quartz pebbles; microscopic examination showed the mineral to be quite impure, containing much limonite and clayey material: 1016; chemical analysis of the carnotite gave 7.2% V_2O_5, 23.8% UO_3, 6.1% F_2O_3, 1.5% CaO, 1.6% K_2O (diff.), 10.5% H_2O, and 49.3% insoluble material; after extraction of the water, iron, and insoluble material, another chemical analysis gave 21.1% V_2O_5, 69.8% UO_3, 4.4% CaO, and 4.7% K_2O (diff.); these analyses compared favorably with those for Colorado and South Australian carnotites and the mineral is considered to belong to the uranite group: 1016.

PENNSYLVANIA (contd.)

Carbon County (contd.)
Uranium Occurrences
Jim Thorpe (formerly Mauch Chunk)
Mount Pisgah, roadcut on Pennsylvania Highway 29-209 W of town on N flank of: uranium deposit in basal Pennsylvanian Pottsville formation, a highly siliceous dark gray quartz conglomerate; an irregular but conspicuous yellow coating of carnotite and other secondary uranium minerals occur for 2,000 ft. and a black uranium oxide, probably uraninite, occurs below the weathered surface; detailed sampling shows that U concentrations cut slightly across the bedding down dip, perhaps controlled by jointing, and distribution along the strike is irregular with the uranium-bearing material forming shoots rather than tabular sheets; in the main stope, a conspicuous fault forms the back and the long direction of the ore shoot parallels the slickensides; occurrence has been known since 1874 and is now being developed by the Lehigh Coal and Navigation Co.: 1005.
Penn Haven Junction, 0.4 mi. S of station, on both sides of Lehigh River: uranium deposit on land owned by Lehigh Coal and Navigation Co. on W side of river and by the Commonwealth of Pennsylvania on E side of river; no development work has been done yet; uranium-bearing rock at an elevation of 720 ft. in upper part of Catskill formation in a local anticline on N limb of Broad Mountain anticline mineralized rock is gray to greenish-gray, medium-grained graywacke; on E side of river, rock occurs along an abandoned railroad bed and is less radioactive than that on W side of river, so no detailed sampling

PENNSYLVANIA (contd.)

Carbon County (contd.)
Uranium Occurrences
Jim Thorpe (formerly Mauch Chunk)
Penn Haven Junction:
was done here; on the W side of river, the rock crops out for about 300 ft. along the Lehigh Valley Railroad tracks in a zone between the track level and 10 ft. above it; kasolite and an unidentified yellow fluorescent mineral, probably uranophane, occur sparingly as flakes and incrustations on bedding-plane and fracture surfaces and uranium is also disseminated in the rock; radioactivity measurement and two chemical analyses of 12 chip samples and 1 grab sample gave the following results: for the 12 chip samples, a range of 0.002-0.25% eU and 0.001-0.24% U and for the grab sample 0.60% eU and, in both analyses, 0.56% U; similar measurement and analysis of one grab sample from a highly radioactive zone on E side of river gave: 0.32% eU and, in both analyses, 0.30% U: 817; uranium-bearing sandstone of upper part of Catskill formation of Devonian age occurs along 300 ft. of outcrop on W side of Lehigh River and outcrops on E side of river about 500 ft. away; assays of 13 samples from western outcrop weighted against length of sample averaged 0.053% U and a selected sample from eastern outcrop showed 0.30% U; both kasolite and uranophane occurred sparingly in this locality: 995.

PENNSYLVANIA (contd.)

Carbon County (contd.)
Uranium Occurrences
Jim Thorpe (formerly Mauch Chunk)
Penn Haven Junction, 600 yds. S of, on W bank of Lehigh River: radioactive outcrop discovered in 1953 by a U.S.G.S. geologist at crest of a minor anticline in dark gray sandstone containing flattened mud pellets and lithologically similar to the meta-autunite occurrence at Mauch Chunk ridge; radioactive zone is 1-4 ft. thick parallel to the strata and exposed for a distance of 200 ft. in the cliff along the Lehigh Valley Railroad tracks; at a spot where flaky greenish-yellow minerals are associated with a sulphide, which seems to have replaced plant fragments, scintillometer reading was 2,500 counts per second or approximately equal to that at the outcrop of a large lense at Mount Pisgah, which had an average U_3O_8 content of 0.5%; uranium-bearing strata also appear to be present on E bank of river since, despite a cover of rubble, some radioactivity has been detected there; uranium zone is stratigraphically about 1,550 ft. below the Mauch Chunk shale and below the Pocono, and probably not far stratigraphically from the Mauch Chunk ridge occurrence; one other radioactive outcrop at approximately the same stratigraphic horizon occurs 1.66 mi. S of Penn Haven Junction on the W side of river along the tracks where olive-gray shale and arkosic sandstone show radioactivity along two fractures although the mineralized zone at the outcrop is not more than several square feet in area: 733.

PENNSYLVANIA (contd.)

Carbon County (contd.)
Uranium Occurrences
Williams (formerly Sherrer)
quarry N of Easton: thorianite, chemical analysis gave 4.44 UO_2, 33.15 UO_3, 38.47 ThO_2; calculated geologic age, 790 m.y.: 1012.
Ore Guides
Jim Thorpe (formerly Mauch Chunk)
Ore controls: sedimentary control, as indicated by confinement of uranium mineralization within very narrow stratigraphic limits, despite numerous joints striking across the strata, and by the almost N-S alignment of the three Catskill occurrences possibly indicating uranium deposition by a stream or streams coming from the Precambrian crystalline areas to the south and southeast: 733; structural control, by the shears, of which most are parallel to strata, and by the plateau border zone where severe stretching of the strata no doubt resulted in increased fracturing: 733.
Origin
Jim Thorpe (formerly Mauch Chunk)
Origin: uranium may have been introduced in some form of the primary oxide, uraninite, by hydrothermal solutions, since this mineral has been found at Mount Pisgah at the present time; however, if the uranium was introduced in post-Pottsville time, it is difficult to determine why uranium is not present in beds higher than the Pottsville where there is so much carbon, assuming such uranium had some affinity for carbon, and why it is not more widely

PENNSYLVANIA (contd.)

Carbon County (contd.)
Uranium Occurrences
Origin
Jim Thorpe (formerly Mauch Chunk)
Origin:
distributed vertically throughout much of the Pocono, Pottsville, and higher parts of the Catskill formation which contain many stratigraphic horizons essentially identical with and just as much fractured as those in which the uranium in found: 733; uranium may have been deposited by hydrothermal replacement, during a major deformational period, in the sheared and brecciated sedimentary rocks either as some form of the primary U oxide, uraninite, or as a highly radioactive decomposition product; after the deformation period, the primary U oxides may have been dissolved by groundwater and deposited as carnotite and tyuyamunite in the Pottsville sandstone and conglomerate and as U phosphates in the Catskill sandstone; such deposition is still going on today in the Pottsville formation: 867; factors that must be considered in determining the origin of uranium here include: sedimentary control; presence of carbon in sediments; shears and other minor fractures; alignment of deposits in a nearly N-S line in fold-plateau border; great stratigraphic distance between Catskill and Pottsville uranium deposits; and the probable hydrothermal mineral at Mount Pisgah: 733; carnotite at Mount Pisgah; disintegration of Precambrian and early Paleozoic crystalline rocks, commonly carrying

PENNSYLVANIA (contd.)

Carbon County (contd.)
Uranium Occurrences
Origin
Jim Thorpe (formerly Mauch Chunk)
Origin:
uranium and vanadium minerals, which previously surrounded this region and precipitation of minerals carrying the heavier metals from groundwater in the "black sand" lenses because of their having a higher specific gravity than the quartz which makes up most of the sediments: 1017; carnotite occurs in the synclinal mass at E end of Mount Pisgah as scattered streaks and patches, very irregularly distributed, in the lower portion of the conglomerate of the Pottsville formation; conglomerate also contains lenses of non-carbonaceous black shale; origin: in its present form, the carnotite was deposited by circulating waters but its original source in the formation was probably the lenses of black shale, which owes its color to the presence of very finely divided hornblende, biotite, and similar dark minerals and not to carbon; uranium may have been derived from metamorphic rocks of the New York-Pennsylvania Highlands, which contain radioactive minerals, and then accumulated in the fine black sand lenses with the vanadium; some pebbles in the conglomerate may contain uranium but evidence of this has not been found so far; development of the carnotite deposits appears to have been made possible by mechanical concentration

PENNSYLVANIA (contd.)

Carbon County (contd.)
Uranium Occurrences
Origin
Jim Thorpe (formerly Mauch Chunk)
Origin:
of uranium and vanadium minerals, originally distributed in large bodies of crystalline rocks, brought about by a sudden change from a dry to a moist climate; a similar origin may explain the presence of carnotite in rocks of Colorado and Utah and also the frequent association of uranium and vanadium with coal: 1016.
Sandstone, Uranium-bearing
Jim Thorpe (formerly Mauch Chunk)
Butcher Hollow, 4 mi. N of Jim Thorpe (formerly Mauch Chunk): uranium-bearing sandstone in upper part of Catskill formation of Devonian age occurs along 30 ft. of outcrop on W side of Lehigh River and in talus on E side of river about 500 ft.; average U content of four samples representing about 2 ft. of six-foot interval of rock, 0.016%, and of selected rock specimen from talus, 0.016%: 995.
Penn Haven Junction, 0.4 mi. S of: uranium-bearing sandstone of upper part of Catskill formation of Devonian age occurs along 300 ft. of outcrop on W side of Lehigh River and outcropst on E side of river about 500 ft. away; assays of 13 samples from western outcrop weighted against length of sample averaged 0.053% U and a selected sample from eastern outcrop showed 0.30% U; both kasolite and uranophane occurred sparingly in this locality: 995.

PENNSYLVANIA (contd.)

Carbon County (contd.)
Uranium Ore Guides
Jim Thorpe (formerly Mauch Chunk)
Ore controls: sedimentary control, as indicated by confinement of uranium mineralization within very narrow stratigraphic limits, despite numerous joints striking across the strata, and by the almost N-S alignment of the three Catskill occurrences possibly indicating uranium deposition by a stream or streams coming from the Precambrian crystalline areas to the south and southeast: 733; structural controls by the shears, of which most are parallel to strata, and by the plateau border zone where severe stretching of the strata no doubt resulted in increased fracturing: 733.

Uranium Production
Jim Thorpe (formerly Mauch Chunk): uranium on Lehigh Coal and Navigation Co. property; small scale mining to be started in summer of 1954 involving only about 200-300 t. uranium-bearing ore: 1085.
Jim Thorpe (formerly Mauch Chunk)
First uranium producing mine in east on edge of Pocono Mountains: Lehigh Coal and Navigation Co. has driven an adit into the orebody, embedded in Pottsville conglomerate located in base of coal measures and containing carnotite and a substance resembling pitchblende; U.S.A.E.C. will take all the uranium produced and stockpile it since there are no uranium mills in eastern United States; presence of carnotite has been recognized here since early 1800's: 1084.

PENNSYLVANIA (contd.)

Carbon County (contd.)
Uranium Production
Jim Thorpe (formerly Mauch Chunk)
Mount Pisgah, roadcut on Pennsylvania Highway 29-209 W of town on N flank of: uranium deposit in basal Pennsylvanian Pottsville formation, a highly siliceous dark gray quartz conglomerate; an irregular but conspicuous yellow coating of carnotite and other secondary uranium minerals occurs for 2,000 ft. and a black uranium oxide, probably uraninite, occurs below the weathered surface; detailed sampling shows that U concentrations cut slightly across the bedding down dip, perhaps controlled by jointing, and distribution along the strike is irregular with the uranium-bearing material forming shoots rather than tabular sheets; in the main stope, a conspicuous fault forms the back and the long direction of the ore shoot parallels the slickensides; occurrence has been known since 1874 and is now being developed by the Lehigh Coal and Navigation Co.: 1005.
Second uranium occurrence was found SE of the town in 1949 by F. A. McKeown of U.S.G.S.; deposit appeared to have commercial possibilities and a short period of production began in July 1954: 1005.

Uranochre Occurrences
Jim Thorpe (formerly Mauch Chunk): radioactive minerals present and, when given, intensity of radiograph on photographic plate: autunite, crystalline scales, moderately active; uranochre(?), thin coating, moderately active: 1018.

PENNSYLVANIA (contd.)

Carbon County (contd.)
Uranophane Occurrence
Jim Thorpe (formerly Mauch Chunk)
Mauch Chunk ridge, in roadcut along U. S. Highway 309 and along Central Railroad of New Jersey tracks: uranium deposit owned partly by Lehigh Coal and Navigation Co. and partly by Stuart Evans; deposit was prospected by core drilling in 1953 and occurs in uraniferous sandstone in the Cherry Ridge red beds of the Catskill formation; the uranium-bearing rock occurs discontinuously for about a mile along the strike and 700 ft. along the dip of the Catskill formation; autunite, kasolite, and uranophane occur on joint surfaces and in cracks in the rock but are not conspicuous on the outcrops; the most radioactive part of the formation is an unidentified black or gray material disseminated in the matrix; radioactivity measurement and two chemical analyses of three grab samples gave the following results: 0.034% eU and 0.030 and 0.031% U; 0.017% eU and 0.012 and 0.011% U; and 0.10% eU and, in both analyses, 0.13% U: 817.
Mount Pisgah: carnotite known here since 1874 on property now owned by Lehigh Coal and Navigation Co.; uranium is found in basal sandstone and conglomerate member of Pottsville formation; uranium minerals identified here include carnotite, tyuyamunite, liebigite, uranophane, and a black radioactive material in the matrix of the rock; minerals occur as coatings on fracture surfaces and slickenside

PENNSYLVANIA (contd.)

Carbon County (contd.)
Uranophane Occurrences
Jim Thorpe (formerly Mauch Chunk)
Mount Pisgah:
surfaces and as incrustations on loosely cemented quartz pebbles in conglomerate and some uranium occurs in cracks in pebbles, in calcite cement filling cracks, and in black material in matrix of rock; some secondary mineralization occurs on surfaces of broken rock: 817; carnotite discovered here in 1874 on property now owned by Lehigh Coal and Navigation Co.; sporadic bright yellow surface coatings are visible on cliff face of basal Pottsville conglomerate over a distance of a half-mile along U. S. Highway 309; U.S.A.E.C. geologists investigated occurrence early in 1952 and U.S.G.S. geologists also studied area; this interest led company to carry out an extensive program of exploratory mining and diamond drilling; minerals found there in recent geologic studies include carnotite, tyuyamunite, and an unknown uranium mineral, possibly uraninite, as well as uranium carbonate efflorescences including some schroeckingerite, an unverified as yet but reported kasolite occurrence, and liebigite, andersonite, and uranophane; origin: 867.
Penn Haven Junction, 0.4 mi. S of station, on both sides of Lehigh River: uranium deposit on land owned by Lehigh Coal and Navigation Co. on W side of river and by the Commonwealth of Pennsylvania on E side of river; no development work has been done yet; uranium-bearing rock at an elevation of 720 ft. in upper part of Catskill formation

PENNSYLVANIA (contd.)

Carbon County (contd.)
Uranophane Occurrence
Jim Thorpe (formerly Mauch Chunk)
Penn Haven Junction:
in a local anticline on N limb of Broad Mountain anticline; mineralized rock in gray to greenish-gray, medium-grained graywacke; on E side of river, rock occurs along an abandoned railroad bed and is less radioactive than that on W side of river, so no detailed sampling was done here; on the W side of river, the rock crops out for about 300 ft. along the Lehigh Valley railroad tracks in a zone between the track level and 10 ft. above it; kasolite and an unidentified yellow fluorescent mineral, probably uranophane, occur sparingly as flakes and incrustations on bedding-plane and fracture surfaces and uranium is also disseminated in the rock; radioactivity measurement and two chemical analyses of 12 chip samples and 1 grab sample gave the following results: for the 12 chip samples, a range of 0.002-0.25% eU and 0.001-0.24% U and for the grab sample 0.60% eU and, in both analyses, 0.56% U; similar measurement and analysis of one grab sample from a highly radioactive zone on E side of river gave: 0.32% eU and, in both analyses, 0.30% U: 817; uranium-bearing sandstone of upper part of Catskill formation of Devonian age occurs along 300 ft. of outcrop on W side of Lehigh River and outcrops on E side of river about 500 ft. away; assays of 13 samples from western outcrop weighted against

PENNSYLVANIA (contd.)

Carbon County (contd.)
Uranophane Occurrences
Jim Thorpe (formerly Mauch Chunk)
Penn Haven Junction:
length of sample averaged 0.053% U and a selected sample from eastern outcrop showed 0.30% U; both kasolite and uranophane occurred sparingly in this locality: 995.
Uranothallite Occurrences
Jim Thorpe (formerly Mauch Chunk):
uranothallite, not schroeckingerite found in carnotite locality; mineral identified by X-ray analysis by U. S. government: 1087.
Zippeite Occurrences
Jim Thorpe (formerly Mauch Chunk):
Pottsville conglomerate on route U. S. 309 contains carnotite probably also zippeite, and thin fluorescent coating of schroeckingerite: 1078.

Carbonaceous Shales, Uranium-bearing
See under individual county names and under Index III, Carbonaceous Shales, Uranium-bearing-Pennsylvania: 1005.

Carnotite Occurrences
See under individual county names and under Index III, Carnotite Occurrences-Pennsylvania: 7, 20, 46, 78, 82, 444, 509, 635, 669, 733, 759, 765, 766, 817, 865, 867, 873, 874, 883, 917, 973, 975, 1005, 1013, 1015, 1016, 1017, 1042, 1075, 1076, 1077, 1078, 1083, 1084, 1087, 1098, 1106.

PENNSYLVANIA (contd.)

Centre County
Radioactive Clay
Phillipsburg quadrangle
Active strip pit, 0.2 mi. N of railroad at Gorton: radioactivity of clay and coal in the A or Brookville coal in a syncline; total 27 in. of coal, 0.016 mr/hr., 43 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; top 3 in. of underclay underlying coal, 0.030 mr/hr., 145 counts/minute, 0.003% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.
Radioactive Coal
Phillipsburg quadrangle
Active strip pit, 0.2 mi. N of railroad at Gorton: radioactivity of clay and coal in the A or Brookville coal in a syncline: total 27 in. of coal, 0.016 mr/hr., 43 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; top 3 in. of underclay underlying coal, 0.030 mr/hr., 145 counts/minute, 0.003% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.
Radioactive Rocks
Milesburg: radiometric examination in the field of Rose Hill shale(?), Keefer sandstone(?), red shales and sandstone, no radioactivity found; no analysis for U or P_2O_5: 935.

Chalcolite Occurrences
See under individual county names and under Index III, Chalcolite Occurrences-Pennsylvania: 911.

PENNSYLVANIA (contd.)

Chester County
Allanite Occurrences
General: allanite: 249, 635.
Coventry Township: allanite: 82, 1098.
Pughtown: allanite: 762, 975.
East Bradford Township: allanite: 82, 1098.
Amos Davis' farm, 1 mi. SW of West Chester: allanite in Baltimore (?) gneiss: 665; allanite in decomposed gneiss: 762; radioactive minerals present and, when given, intensity of radiograph on photographic plate: allanite: 1018.
Comley Hall: allanite: 975.
Field NE of Comley Hall, just E of Sconnelltown and SW of West Chester: black masses of allanite, coated with thick brown weathered product, in specimens weighing up to a pound, found in pegmatites: 766.
Minorcus Hill: allanite: 975; allanite in primal slates: 927.
West Chester, 1½ mi. NW of: pitch black allanite in altered primal slates: 927.
Newlin Township
Corundum Hill: allanite: 975.
Corundum mines on Corundum Hill, 2 mi. NE of Unionville: questionable occurrences of allanite and beryl: 766.
Corundum mines on J. Patterson's farm, 1½ miles northeast of Unionville: allanite in serpentine and pegmatite: 665.
Serpentine Barrens, 1½ mi. NE of Unionville: allanite in primal slates: 927.
Pughtown, Area south of: allanite in Baltimore gneiss: 665.
Pughtown, Exposures of: radioactive minerals present and, when given, intensity of radiograph on photographic plate: allanite: 1018.

PENNSYLVANIA (contd.)

Chester County (contd.)
Allanite Occurrences
South Coventry Township S of Pughtown: allanite and zircon: 766.
West Pikeland Township
Chester Springs (formerly Yellow Springs): allanite: 975; allanite in iron pits: 766; allanite and zircon in quartz rock specimen presented to the Academy of Natural Sciences; new locality for allanite: 833.
Chester Springs (formerly Yellow Springs), Iron Mines at: allanite in Baltimore gneiss: 665.
Columbite, Uranium-bearing
Nevin's quarry SW of Landenberg: radioactive minerals present and, when given, intensity of radiograph on photographic plate: columbite, may contain some U: 1018.
Magnetite, Thorium-bearing
French Creek: Triassic magnetite ore, medium-grained magnetite with chloritic gangue and small amount of pyrite, associated with Triassic intrusives and of Palisade age, activity 8.6×10^{-6} cc. He/g., 8.5×10^{-14} g. Ra/g., 1.07×10^{-7} g. Th/g., and age ratio 145 m.y.: 786.
Radioactive Magnetite
French Creek: Triassic magnetite ore, medium-grained magnetite with chloritic gangue and small amount of pyrite, associated with Triassic intrusives and of Palisade age, activity 8.6×10^{-6} cc. He/g., 8.5×10^{-14} g. Ra/g., 1.07×10^{-7} g. Th/g., and age ratio, 145 m.y.: 786.
Radioactive Titanite
Chadd's Ford, Quarry on Brandywine Creek NW of: radioactive minerals present and, when given, intensity of radiograph on photographic plate: titanite, crystals, faintly active: 1018.

PENNSYLVANIA (contd.)

Chester County (contd.)
Thorium Occurrences
General: allanite: 249, 635.
Coventry Township: allanite: 82, 1098.
Pughtown: allanite: 762, 975.
East Bradford Township: allanite: 82, 1098.
Amos Davis' farm, 1 mi. SW of West Chester: allanite in Baltimore (?) gneiss: 665; allanite in decomposed gneiss: 762; radioactive minerals present and, when given, intensity of radiograph on photographic plate: allanite: 1018.
Comley Hall: allanite: 975.
Field NE of Comley Hall, just E of Sconnelltown and SW of West Chester: black masses of allanite, coated with thick brown weathered product, in specimens weighing up to a pound, found in pegmatites: 766.
Minorcus Hill: allanite: 975; allanite in primal slates: 927.
West Chester, 1½ mi. NW of: pitch black allanite in altered primal slates: 927.
French Creek: Triassic magnetite ore, medium-grained magnetite with chloritic gangue and small amount of pyrite, associated with Triassic intrusives and of Palisade age, activity 8.6×10^{-6} cc. He/g., 8.5×10^{-14} g. Ra/g., 1.07×10^{-7} g. Th/g., and age ratio, 145 m.y.: 786.
Newlin Township
Corundum Hill: allanite: 975.
Corundum mines on Corundum Hill, 2 mi. NE of Unionville: questionable occurrences of allanite and beryl: 766.

PENNSYLVANIA (contd.)

Chester County (contd.)
Thorium Occurrences
Newlin township
Corundum mines on J. Patterson's farm, 1½ miles northeast of Unionville: allanite in serpentine and pegmatite: 665.
Serpentine Barrens, 1½ mi. NE of Unionville: allanite in primal slates: 927.
Pughtown, Area S of: allanite in Baltimore gneiss: 665.
Pughtown, Exposures S of: radioactive minerals present and, when given, intensity of radiograph on photographic plate: allanite: 1018.
South Coventry Township S of Pughtown: allanite and zircon: 766.
West Pikeland Township
Chester Springs (formerly Yellow Springs): allanite: 975; allanite in iron pits: 766; allanite and zircon in quartz rock specimen presented to the Academy of Natural Sciences; new locality for allanite: 833.
Chester Springs (formerly Yellow Springs), Iron Mines at: allanite in Baltimore gneiss: 665.
Magnetite, Thorium-bearing
French Creek: Triassic magnetite ore, medium-grained magnetite with chloritic gangue and small amount of pyrite, associated with Triassic intrusives and of Palisade age, activity 8.6×10^{-6} cc. He/g., 8.5×10^{-14} g. Ra/g., 1.07×10^{-7} g. Th/g., and age ratio, 145 m.y.: 786.
Uranium Occurrences
Nevin's quarry SW of Landenberg: radioactive minerals present and, when given, intensity of radiograph on photographic plate: columbite, may contain some U: 1018.
Columbite, Uranium-bearing
Nevin's quarry SW of Landenberg: radioactive minerals present and, when given, intensity of radiograph on photographic plate: columbite, may contain some U: 1018.

PENNSYLVANIA (contd.)

Clarion County
Radioactive Clay
Brookville quadrangle
Old railroad cut on N side of railroad 0.2 mi. E of Sutton Station: radioactivity of Lower Clarion coal and clay in a syncline: radioactivity of top 15 in. and bottom 13 in. of coal respectively, both 0.012 mr./hr., 44 and 41 counts/minute or an average of 43 counts/minute for the coal bed, and both less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; top ft. of the underclay, 0.033 mr./hr., 170 counts/minute, 0.003% eU found by conversion from assay cup-Geiger counter measurement and by two radioactivity measurements in the laboratory: 748.
Old railroad cut on S side of railroad, 0.5 mi. W of Sutton Station: radioactivity of Vanport limestone and underlying Upper Clarion coal in an anticline: limestone, 0.015 mr./hr., 53 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; radioactivity of top 7 in. and bottom 3 in. of coal respectively, 0.015 and 0.024 mr./hr., 46 and 55 counts/minute or an average of 49 counts/minute for the coal bed, and in both, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.

PENNSYLVANIA (contd.)

Chester County (contd.)
Allanite Occurrences
South Coventry Township S of Pughtown: allanite and zircon: 766.
West Pikeland Township
Chester Springs (formerly Yellow Springs): allanite: 975; allanite in iron pits: 766; allanite and zircon in quartz rock specimen presented to the Academy of Natural Sciences; new locality for allanite: 833.
Chester Springs (formerly Yellow Springs), Iron Mines at: allanite in Baltimore gneiss: 665.
Columbite, Uranium-bearing
Nevin's quarry SW of Landenberg: radioactive minerals present and, when given, intensity of radiograph on photographic plate: columbite, may contain some U: 1018.
Magnetite, Thorium-bearing
French Creek: Triassic magnetite ore, medium-grained magnetite with chloritic gangue and small amount of pyrite, associated with Triassic intrusives and of Palisade age, activity 8.6×10^{-6} cc. He/g., 8.5×10^{-14} g. Ra/g., 1.07×10^{-7} g. Th/g., and age ratio 145 m.y.: 786.
Radioactive Magnetite
French Creek: Triassic magnetite ore, medium-grained magnetite with chloritic gangue and small amount of pyrite, associated with Triassic intrusives and of Palisade age, activity 8.6×10^{-6} cc. He/g., 8.5×10^{-14} g. Ra/g., 1.07×10^{-7} g. Th/g., and age ratio, 145 m.y.: 786.
Radioactive Titanite
Chadd's Ford, Quarry on Brandywine Creek NW of: radioactive minerals present and, when given, intensity of radiograph on photographic plate: titanite, crystals, faintly active: 1018.

PENNSYLVANIA (contd.)

Chester County (contd.)
Thorium Occurrences
General: allanite: 249, 635.
Coventry Township: allanite: 82, 1098.
Pughtown: allanite: 762, 975.
East Bradford Township: allanite: 82, 1098.
Amos Davis' farm, 1 mi. SW of West Chester: allanite in Baltimore (?) gneiss: 665; allanite in decomposed gneiss: 762; radioactive minerals present and, when given, intensity of radiograph on photographic plate: allanite: 1018.
Comley Hall: allanite: 975.
Field NE of Comley Hall, just E of Sconnelltown and SW of West Chester: black masses of allanite, coated with thick brown weathered product, in specimens weighing up to a pound, found in pegmatites: 766.
Minorcus Hill: allanite: 975; allanite in primal slates: 927.
West Chester, 1½ mi. NW of: pitch black allanite in altered primal slates: 927.
French Creek: Triassic magnetite ore, medium-grained magnetite with chloritic gangue and small amount of pyrite, associated with Triassic intrusives and of Palisade age, activity 8.6×10^{-6} cc. He/g., 8.5×10^{-14} g. Ra/g., 1.07×10^{-7} g. Th/g., and age ratio, 145 m.y.: 786.
Newlin Township
Corundum Hill: allanite: 975.
Corundum mines on Corundum Hill, 2 mi. NE of Unionville: questionable occurrences of allanite and beryl: 766.

PENNSYLVANIA (contd.)

Chester County (contd.)
Thorium Occurrences
Newlin township
Corundum mines on J. Patterson's farm, 1½ miles northeast of Unionville: allanite in serpentine and pegmatite: 665.
Serpentine Barrens, 1½ mi. NE of Unionville: allanite in primal slates: 927.
Pughtown, Area S of: allanite in Baltimore gneiss: 665.
Pughtown, Exposures S of: radioactive minerals present and, when given, intensity of radiograph on photographic plate: allanite: 1018.
South Coventry Township S of Pughtown: allanite and zircon: 766.
West Pikeland Township
Chester Springs (formerly Yellow Springs): allanite: 975; allanite in iron pits: 766; allanite and zircon in quartz rock specimen presented to the Academy of Natural Sciences; new locality for allanite: 833.
Chester Springs (formerly Yellow Springs), Iron Mines at: allanite in Baltimore gneiss: 665.
Magnetite, Thorium-bearing
French Creek: Triassic magnetite ore, medium-grained magnetite with chloritic gangue and small amount of pyrite, associated with Triassic intrusives and of Palisade age, activity 8.6×10^{-6} cc. He/g., 8.5×10^{-14} g. Ra/g., 1.07×10^{-7} g. Th/g., and age ratio, 145 m.y.: 786.
Uranium Occurrences
Nevin's quarry SW of Landenberg: radioactive minerals present and, when given, intensity of radiograph on photographic plate: columbite, may contain some U: 1018.
Columbite, Uranium-bearing
Nevin's quarry SW of Landenberg: radioactive minerals present and, when given, intensity of radiograph on photographic plate: columbite, may contain some U: 1018.

PENNSYLVANIA (contd.)

Clarion County
Radioactive Clay
Brookville quadrangle
Old railroad cut on N side of railroad 0.2 mi. E of Sutton Station: radioactivity of Lower Clarion coal and clay in a syncline: radioactivity of top 15 in. and bottom 13 in. of coal respectively, both 0.012 mr./hr., 44 and 41 counts/minute or an average of 43 counts/minute for the coal bed, and both less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; top ft. of the underclay, 0.033 mr./hr., 170 counts/minute, 0.003% eU found by conversion from assay cup-Geiger counter measurement and by two radioactivity measurements in the laboratory: 748.
Old railroad cut on S side of railroad, 0.5 mi. W of Sutton Station: radioactivity of Vanport limestone and underlying Upper Clarion coal in an anticline: limestone, 0.015 mr./hr., 53 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; radioactivity of top 7 in. and bottom 3 in. of coal respectively, 0.015 and 0.024 mr./hr., 46 and 55 counts/minute or an average of 49 counts/minute for the coal bed, and in both, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.

Clarion County (contd.)
Radioactive Coal
Brookville quadrangle
Old railroad cut on N side of railroad 0.2 mi. E of Sutton Station: radioactivity of Lower Clarion coal and clay in a syncline: radioactivity of top 15 in. and bottom 13 in. of coal respectively, both 0.012 mr./hr., 44 and 41 counts/minute or an average of 43 counts/minute for the coal bed, and both less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; top ft. of the underclay, 0.033 mr./hr., 170 counts/minute, 0.003% eU found by conversion from assay cup-Geiger counter measurement and by two radioactivity measurements in the laboratory: 748.
Old railroad cut on S side of railroad, 0.5 mi. W of Sutton Station: radioactivity of Vanport limestone and underlying Upper Clarion coal in an anticline: limestone, 0.015 mr./hr., 53 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; radioactivity of top 7 in. and bottom 3 in. of coal respectively, 0.015 and 0.024 mr./hr., 46 and 55 counts/minute or an average of 49 counts/minute for the coal bed, and in both, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.
Clarion quadrangle
G.H. Styles Co. strip mine on hill N of Clarion River, 2 mi. E of Pa. Highway 966 bridge: radioactivity of Lower Clarion coal between shale and impure pyritic coal, less than 0.001% eU: 893.

Clarion County (contd.)
Radioactive Coal
Clarion Quadrangle
Grasso Coal Co. strip mine at Day: radioactivity of Lower Kittanning coal between two shales, less than 0.001% eU: 893.
Grasso Coal Co. strip mine, ½ mi. E of Clarion: radioactivity of Lower Kittanning coal in two coals separated by non-radioactive bony coal, both less than 0.001% eU: 893.
Mays Coal Co. strip mine on Pa. Highway 66, 1.3 mi. S of Limestone: radioactivity of Lower Clarion coal between shale and clay and Lower Kittanning coal between siltstone and clay, both less than 0.001% eU: 893.
Wingert Construction Co. strip mine on Pa. Highway 854, 4 mi. N of Curlsville: radioactivity of Lower Kittanning coal between mudstone and siltstone, less than 0.001% eU:893.
Wingert Construction Co. strip mine at Sligo: radioactivity of Lower Clarion coal between shale and impure coal, less than 0.001% eU: 893.
Foxburg Quadrangle
M.A.C. Coal Co. strip mine, 2 mi. NW of Rimmersburg: radioactivity of Lower Kittanning coal between shale and clay, less than 0.001% eU: 893.

Clarkeite Occurrences
See under individual county names and under Index III, Clarkeite Occurrences-Pennsylvania: 1012.

Clay, Uranium-bearing
See under individual county names and under Index III, Clay, Uranium-bearing-Pennsylvania: 748.

PENNSYLVANIA (contd.)

Clearfield County
Clay, Uranium-bearing
Houtzdale quadrangle
Mine near portal on W side of paved road about 3 mi. N of Henderson: radioactivity of flint clay in Mercer coal formation, at 2, 5, and 6 ft. from top respectively: 2 ft. from top, 0.041 mr./hr., 198 counts/minute, 0.004% eU found by conversion from assay cup-Geiger counter measurement, 0.002% eU by two radioactivity measurements in the laboratory, 0.001% U in sample, 0.001% U in ash; 5 ft. from top, 0.049 mr./hr., 131 counts/minute, 0.002% eU found by conversion from assay cup-Geiger counter measurement and 0.003% eU by two radioactivity measurements in the laboratory; 6 ft. from top, 0.045 mr./hr., 147 counts/minute, 0.003% eU found by conversion from assay cup-Geiger counter measurement and by two radioactivity measurements in the laboratory, 0.0007% U in sample, 0.0004% U in ash: 748.
Penfield quadrangle
Mine at face 0.7 mi. S of Chestnut Grove: radioactivity of clay underlying coal: flint clay lying directly under, and 1.5, 3, 4.5, and 6 ft. below coal respectively 0.033, 0.042, 0.038, 0.036, 0.034 mr./hr., 146, 140, 96, 97, and 105 counts/minute, 0.003, 0.003, 0.001, 0.001, 0.002% eU found by conversion from assay cup-Geiger counter measurement and 0.002, 0.002, and three 0.001% U by radioactivity measurement in the laboratory: 748.
Coal, Uranium-bearing
General: reconnaissance radioactivity examination of 360 coal samples from 86 mines in Allegheny, Butler, Cambria, Clarion, Clearfield, Indiana, Jefferson, Lawrence, Mercer, Somerset, and Westmoreland counties; the beds sampled were the Brookfield, Lower and Upper Clarion, Lower, Middle, and Upper Kittanning, and Lower and Upper

PENNSYLVANIA (contd.)

Clearfield County (contd.)
Coals, Uranium-bearing
General:
Freeport of the Allegheny series, the Bakerstown of the Conemaugh series, and the Pittsburgh and Redstone of the Monongahela series; none of the coal beds showed more than 0.002% eU; in Clearfield county a thin bone layer overlying the Upper Freeport bed showed as much as 0.040% eU but no unusual radioactivity was shown by coal immediately above the bonelayer or other coals above, below, and on either side of the locality for a distance of two miles: 995.
Clearfield Quadrangle
Krolick Coal Co. strip mine at LeContes Mills: radioactivity reported in upper 0.4 ft. of the 3.2 ft. thick Lower Freeport coal bed in the following seams, starting with the uppermost in bony irregular plates, 0.033% eU, and by chemical analysis, 11.9% ash and 0.041% U in sample; pyritic weathered coal, 0.009% eU, and by chemical analysis, 0.012% U in sample; weathered coal, 0.001% eU; weathered coal, less than 0.001% eU, and underlying medium gray clay, 0.003% eU; average radioactivity of the radioactive portion of this coal bed, 0.019% U; one three-inch block of coal on dump contained 0.040% U; search of immediate area in mines and outcrops for several miles around showed no additional radioactivity; source of uranium in this coal not determined: 893.

Clearfield County (contd.)
Coal, Uranium-bearing
Houtzdale quadrangle
Old strip pit on W side of Clearfield Creek, 2.3 mi. NE of Faunce: radioactivity of four layers of Mercer coal, with an average of 43 counts/minute for two upper layers and 89 counts/minute for all four, in a syncline: radioactivity of top 15 in., bottom 15 in., and top 9 in. of coal respectively, 0.014, 0.018, and 0.029 mr./hr., 44, 41, and 58 counts/minute, and all less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; bottom 4 in. bony coal, 0.042 mr./hr., 159 counts/minute, 0.003% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory, 0.002% U in sample, 0.003% U in ash: 748.
Karthus quadrangle
Active strip pit about 1.8 mi. S of Keewaydin: radioactivity of Upper and Middle Kittanning coal on flank: radioactivity of 24 in. of Upper Kittanning coal, and top 9 in. and bottom 23 in. of Lower Kittanning coal respectively, 0.010, 0.022, and 0.015 mr./hr., 38, 60, and 40 counts/minute with an average of 46 counts/minute, all less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory except the top 9 in. of Lower Kittanning coal which showed 0.001% eU in the laboratory and 0.0004% U in sample and 0.0006% U in ash: 748.
Penfield quadrangle
Old strip pit 0.7 mi. S of Chestnut Grove: radioactivity of 6 layers of Mercer coal in an anticline; starting with upper layer: top 4 in. coal 0.018 mr./hr., 70 counts/minute, 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity

Clearfield County (contd.)
Coal, Uranium-bearing
Penfield quadrangle
Old strip pit 0.7 mi. S of Chestnut Grove: measurement in the laboratory, 0.0007% U in sample, 0.001% U in ash; bottom 23 in. and top 4 in. of coal respectively 0.015 and 0.24 mr./hr., 53 and 56 counts/minute, both less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurements in the laboratory; middle 6 in. bony coal, 0.024 mr./hr., 106 counts/minute, 0.002% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory, 0.0006% U in sample, 0.002% U in ash; bottom 7 in. of coal, 0.030 mr./hr., 117 counts/minute, 0.002% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory, 0.0006% U in sample, 0.002% U in ash; 6 in. of coal, 0.028 mr./hr., 50 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.
Radioactive Clay
Houtzdale quadrangle
Active strip pit 0.5 mi. S of depot at Bigler: radioactivity of coal and clay in the A' or Lower Clarion coal in an anticline: coal 0.015 mr./hr., 31 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; underclay 4 ft. below

PENNSYLVANIA (contd.)

Clearfield County (contd.)
Radioactive Clay
Houtzdale quadrangle
Active strip pit 0.5 mi. S of depot at Bigler: coal 0.030 mr./hr., 138 counts/minute, 0.002% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.
Mine near portal on W side of paved road about 3 mi. N of Henderson: radioactivity of flint clay in Mercer coal formation, at 2, 5, and 6 ft. from top respectively: 2 ft. from top, 0.041 mr./hr., 198 counts/minute, 0.004% eU found by conversion from assay cup-Geiger counter measurement, 0.002% eU by two radioactivity measurements in the laboratory, 0.001% U in sample, 0.001% U in ash; 5 ft. from top, 0.049 mr./hr., 131 counts/minute, 0.002% eU found by conversion from assay cup-Geiger counter measurement and 0.003% eU by two radioactivity measurements in the laboratory; 6 ft. from top, 0.045 mr./hr., 147 counts/minute, 0.003% eU found by conversion from assay cup-Geiger counter measurement and by two radioactivity measurements in the laboratory, 0.0007% U in sample, 0.0004% U in ash: 748.
Mine near portal on S side of U.S. Highway 322, 1.25 mi. W of junction with Pennsylvania Highway 970: radioactivity of clay and coal in Mercer coal in syncline: coal 0.028 mr./hr., 45 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; flint clay 9 in. below coal, 0.036 mr./hr., 140 counts/minute, 0.003% eU found by conversion from assay cup-Geiger counter measurement and 0.002% eU by radioactivity measurement in the laboratory: 748.

PENNSYLVANIA (contd.)

Clearfield County (contd.)
Radioactive Clay
Houtzdale quadrangle
Old strip pit on W side of U.S. Highway 322, 0.15 mi. S of junction with Pennsylvania Highway 153: radioactivity of coal and clay in the A' or Lower Clarion coal in an anticline: coal, 0.014 mr./hr., 32 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; underclay 10 ft. below coal, 0.031 mr./hr., 135 counts/minute, 0.002% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.
Penfield quadrangle
Mine at face 0.7 mi. S of Chestnut Grove: radioactivity of clay underlying coal: flint clay lying directly under, and 1.5, 3, 4.5 and 6 ft. below coal respectively 0.033, 0.042, 0.038, 0.036, 0.034 mr./hr., 146, 140, 96, 97, and 105 counts/minute, 0.003, 0.003, 0.001, 0.001, 0.002% eU found by conversion from assay cup-Geiger counter measurement and 0.002, 0.002, and three 0.001% U by radioactivity measurement in the laboratory: 748.
Mine at another face 0.7 mi. S of Chestnut Grove: radioactivity of flint clay underlying Mercer coal, 0.044 mr./hr., 125 counts/minute, 0.002% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.

PENNSYLVANIA (contd.)

Clearfield County (contd.)
Radioactive Clay
Penfield quadrangle
Mine near portal 0.7 mi. S of Chestnut Grove: radioactivity of clay underlying Mercer coal: flint clay lying directly under, 3.5 ft. below, and 6 ft. below coal respectively 0.042, 0.040, and 0.029 mr./hr., 93, 132 and 89 counts/minute, 0.001, 0.002, and 0.001% eU found by conversion from assay cup-Geiger counter measurement and all less than 0.001% eU by radioactivity measurement in the laboratory: 748.
Old strip pit on N side of Pennsylvania Highway 951, 1.4 mi. W of Luthersburg: radioactivity of clay and coal on flank: top 7 in. and bottom 14 in. of coal respectively, 0.025 and 0.026 mr./hr., 44 and 39 counts/minute with an average of 41 counts/minute for coal bed, both less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; top 2.5 in. of underclay, 0.030 mr./hr., 137 counts/minute, 0.002% eU found by conversion from assay cup-Geiger counter measurement and less than 0.001% eU by radioactivity measurements in the laboratory: 748.
Radioactive Coal
Clearfield Quadrangle
Abandoned strip mine at LeContes Mills, lying 44 ft. above Lower Freeport ("D" or Moshanon) coal: radioactivity of Upper Freeport coal bed in coals listed from upper to lower positions: weathered coal, less than 0.001% eU; bony coal, less than 0.001% eU; weathered coal, appears bright, 0.001% eU: 893.

PENNSYLVANIA (contd.)

Clearfield County (contd.)
Radioactive Coal
Clearfield quadrangle
Active strip pit on S side of paved road 1.7 mi. SW of Shiloh: radioactivity of the B or Lower Kittanning coal in an anticline, top 25 in. and bottom 9 in. respectively, 0.014 and 0.022 mr./hr., 38 and 58 counts/minute with an average of 43 counts/minute for coal bed, both less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748; radioactivity of the C or Middle Kittanning coal from high wall of strip pit, 0.018 mr./hr., 58 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.
Krolick Coal Co. drift mine at LeContes Mills: radioactivity of Lower Freeport coal bed in three coals, all less than 0.001% eU, while clay with pyritic parting overlying the lowest slightly weathered coal showed 0.001% eU and light gray clay underlying it, 0.003% eU: 893.
Krolick Coal Co. strip mine at LeContes Mills: radioactivity reported in upper 0.4 ft. of the 3.2 ft. thick Lower Freeport coal bed in the following seams, starting with the uppermost: coal in bony irregular plates, 0.033% eU and by chemical analysis, 11.9% ash and 0.041% U in sample;

PENNSYLVANIA (contd.)

Clearfield County (contd.)
Radioactive Coal
Clearfield quadrangle
Krolick Coal Co. strip mine at Le-Contes Mills: pyritic weathered coal, 0.009% eU, and by chemical analysis, 0.012% U in sample; weathered coal 0.001% eU; weathered coal, less than 0.001% eU, and underlying medium gray clay, 0.003% eU; average radioactivity of the radioactive portion of this coal bed, 0.019% U; one three-inch block of coal on dump contained 0.040% U; search of immediate area in mines and outcrops for several miles around showed no additional radioactivity; source of uranium in this coal not determined: 893.
Old strip pit on E side of unpaved road 0.3 mi. S of Bishtown: radioactivity of the C' or Upper Kittanning coal, with an average of 49 counts/minute for the bed, in a syncline: top 10 in. and middle 28 in. of cannel coal 0.021 and 0.015 mr./hr., 57 and 50 counts/minute, both less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; middle 3 in. and bottom 8 in. of coal respectively 0.014 and no mr./hr., 35 and 40 counts/minute, both less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.
Curwensville quadrangle
Active strip pit on N side of paved road, 0.8 mi. NE of Ansonville: radioactivity of the D or Lower Freeport coal in a syncline, 0.012 mr./hr., 36 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurements in the laboratory: 748.

PENNSYLVANIA (contd.)

Clearfield County (contd.)
Radioactive Coal
Curwensville quadrangle
Active strip pit on S side of Watt's Creek, 0.8 mi. NW of Kerrmoor: radioactivity of the E' or Upper Freeport coal in a syncline, 0.017 mr./hr., 46 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.
Dubois quadrangle
Old strip pit on N side of paved road 0.9 mi. E of Helvetia: radioactivity of Upper Freeport coal, with an average of 41 counts/minute for the three lower sections, in a syncline, starting with upper layer: Upper Freeport Rider coal, 0.022 mr./hr., 55 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; top 26 in., middle 22 in., and bottom 22 in. of Upper Freeport coal, all 0.010 mr./hr., 45, 35 and 42 counts/minute, all less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurements in the laboratory: 748.
Houtzdale quadrangle
Active strip pit 0.5 mi. S of depot at Bigler: radioactivity of coal and clay in the A' or Lower Clarion coal in an anticline: coal 0.015 mr./hr., 31 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement

PENNSYLVANIA (contd.)

Clearfield County (contd.)
Radioactive Coal
Houtzdale quadrangle
Active strip pit 0.5 mi. S of depot at Bigler: and by radioactivity measurement in the laboratory; underclay 4 ft. below coal 0.030 mr./hr., 138 counts/minute, 0.002% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.
Mine near portal on S side of U.S. Highway 322, 1.25 mi. W of junction with Pennsylvania Highway 970: radioactivity of clay and coal in Mercer coal in syncline: coal 0.028 mr./hr., 45 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; flint clay 9 in. below coal, 0.036 mr./hr., 140 counts/minute, 0.003% eU found by conversion from assay cup-Geiger counter measurement and 0.002% eU by radioactivity measurements in the laboratory: 748.
Old railroad cut on N side of railroad and on S side of U.S. Highway 322, 2.5 mi. S of Hyde: radioactivity of the A' or Lower Clarion coal in a syncline, 0.016 mr./hr., 37 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.
Old strip pit on S side of Pennsylvania Highway 53, 2.3 mi. NE of junction with Pennsylvania Highway 353 in Houtzdale: radioactivity of Lower Freeport coal in a syncline, top 33 in. and bottom 33 in. of coal respectively, both 0.015 mr./hr., 47 and 43 counts/minute or an average of 45 counts/

PENNSYLVANIA (contd.)

Clearfield County (contd.)
Radioactive Coal
Houtzdale quadrangle
Old strip pit...: minute for the coal bed, both less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.
Old strip pit on W side of Clearfield Creek, 2.3 mi. NE of Faunce: radioactivity of four layers of Mercer coal, with an average of 43 counts/minute for two upper layers and 89 counts/minute for all four, in a syncline: radioactivity of top 15 in., bottom 15 in., and top 9 in. of coal respectively, 0.014, 0.018, and 0.029 mr./hr., 44, 41, and 58 counts/minute, and all less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; bottom 4 in. bony coal, 0.042 mr./hr., 159 counts/minute, 0.003% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory, 0.002% U in sample, 0.003% U in ash: 748; radioactivity of Mercer coal in high wall of pit, 0.015 mr./hr., 54 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.

PENNSYLVANIA (contd.)

Clearfield County (contd.)
Radioactive Coal
Houtzdale quadrangle
Old strip on W side of U.S. Highway 322, 0.15 mi. S of junction with Pennsylvania Highway 153: radioactivity of coal and clay in the A' or Lower Clarion coal in an anticline: coal, 0.014 mr./hr., 32 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; underclay 10 ft. below coal, 0.031 mr./hr., 135 counts/minute, 0.002% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.
Oshanter area
Mine near portal on S side of paved road between, and 1 mi. from Oshanter and Faunce: radioactivity of the E' or Upper Freeport coal in a syncline: 0.017 mr./hr., 39 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.
Old strip pit at same locality: radioactivity of Lower Freeport coal in a syncline, top 15 in. of cannel coal and bottom 24 in. of coal respectively, 0.021 and 0.018 mr./hr., 67 and 39 counts/minute with an average of 50 counts/minute for the coal bed, both less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.

PENNSYLVANIA (contd.)

Clearfield County (contd.)
Radioactive Coal
Karthus quadrangle
Active strip pit about 1.8 mi. S of Keewaydin: radioactivity of Upper and Middle Kittanning coal on flank: radioactivity of 24 in. of Upper Kittanning coal, and top 9 in. and bottom 23 in. of Lower Kittanning coal respectively, 0.010, 0.022, and 0.015 mr./hr., 38, 60, and 40 counts/minute with an average of 46 counts/minute, all less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and radioactivity measurement in the laboratory except the top 9 in. of Lower Kittanning coal which showed 0.001% eU in the laboratory and 0.0004% U in sample and 0.0006% U in ash: 748.
Penfield quadrangle
Active strip pit on N side of unpaved road 0.4 mi. NE of Luthersburg station: radioactivity of Lower Kittanning coal on flank, top 11 in. and bottom 20 in. of coal respectively, both 0.022 mr./hr., 36 and 55 counts/minute with an average of 48 counts/minute for coal bed, both less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748; radioactivity of Upper Kittanning coal from high wall of pit; 0.024 mr./hr., 38 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.

PENNSYLVANIA (contd.)

Clearfield County (contd.)
Radioactive Coal
Penfield quadrangle
Active strip pit on S side of U.S. Highway 322, 1.8 mi. SE of Chestnut Grove: radioactivity of the A' or Lower Clarion coal in an anticline, 0.013 mr./hr., 46 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.
Fresh prospect pit 0.1 mi. NW of tracks at Luthersburg railroad station: radioactivity of Clarion coal on flank, top 16 in. and bottom 9 in. of coal respectively, 0.012 and 0.016 mr./hr., 39 and 42 counts/minute with an average of 40 counts/minute for coal bed, both less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.
Mine near portal on E side of Pennsylvania Highway 153, 3.7 mi. SE of Penfield: radioactivity of coal in a syncline, 0.014 mr./hr., 42 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.
Mine near portal on E side of unpaved road 3.4 mi. N of Sabula: radioactivity of dark shale and coal in Lower Kittanning coal in a syncline: shale 1 ft. above coal, 0.038 mr./hr., 164 counts/minute, 0.003% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; coal, 0.018 mr./hr., 36 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.

PENNSYLVANIA (contd.)

Clearfield County (contd.)
Radioactive Coal
Penfield quadrangle
Old strip pit 0.7 mi. S of Chestnut Grove: radioactivity of 6 layers of Mercer coal in an anticline; starting with upper layer: top 4 in. coal 0.018 mr./hr., 70 counts/minute, 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory, 0.0007% U in sample, 0.001% U in ash; bottom 23 in. and top 4 in. of coal respectively 0.015 and 0.24 mr./hr., 53 and 56 counts/minute, both less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurements in the laboratory; middle 6 in. bony coal, 0.024 mr./hr., 106 counts/minute, 0.002% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory, 0.006% U in sample, 0.002% U in ash; bottom 7 in. of coal, 0.030 mr./hr., 117 counts/minute, 0.002% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory, 0.0006% U in sample, 0.002% U in ash; 6 in. of coal, 0.028 mr./hr., 50 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.

PENNSYLVANIA (contd.)

Clearfield County (contd.)
Radioactive Coal
Penfield quadrangle
Old strip pit on N side of Pennsylvania Highway 951, 1.4 mi. W of Luthersburg: radioactivity of clay and coal in Lower Freeport coal on flank: top 7 in. and bottom 14 in. of coal respectively, 0.025 and 0.026 mr./hr., 44 and 39 counts/minute with an average of 41 counts/minute for coal bed; both less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; top 2.5 in. of underclay, 0.030 mr./hr., 137 counts/minute, 0.002% eU found by conversion from assay cup-Geiger counter measurement and less than 0.001% eU by radioactivity measurements in the laboratory: 748.
Active strip pit on S side of paved road, 1.4 mi. SW of Homecamp: radioactivity of shale and coal in Lower Kittanning coal in a syncline; dark shale 20 in. over coal, 0.032 mr./hr., 146 counts/minute, 0.003% eU found by conversion from assay cup-Geiger counter measurement and less than 0.001% eU by radioactivity measurement in the laboratory; top 8 in. and bottom 21 in. of coal respectively, both 0.018 mr./hr., 38 and 40 counts/minute with an average of 39 counts/minute for the coal bed, both less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the lab.:748.
Old strip pit on S side of unpaved road about 0.2 mi. SW of Luthersburg station: radioactivity of Middle Kittanning coal on flank, top 19 in. and bottom 12 in. respectively, both 0.022 mr./hr., 50 and 43 counts/minute with an average of 47 counts/minute for coal bed, both less than 0.001%

PENNSYLVANIA (contd.)

Clearfield County (contd.)
Radioactive Coal
Penfield quadrangle
Old strip pit...:
eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.
Radioactive Rocks
Penfield quadrangle
Active strip pit on S side of paved road, 1.4 mi. SW of Homecamp: radioactivity of shale and coal in Lower Kittanning coal in a syncline: dark shale 20 in. over coal, 0.032 mr./hr., 146 counts/minute, 0.003% eU found by conversion from assay cup-Geiger counter measurement and less than 0.001% eU by radioactivity measurement in the laboratory; top 8 in. and bottom 21 in. of coal respectively, both 0.018 mr./hr., 38 and 40 counts/minute with an average of 39 counts/minute for the coal bed, both less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.
Mine near portal on E side of unpaved road 3.4 mi. N of Sabula: radioactivity of dark shale and coal in Lower Kittanning coal in a syncline: shale 1 ft. above coal, 0.038 mr./hr., 164 counts/minute, 0.003% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; coal 0.018 mr./hr., 36 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.

Clearfield County (contd.)
Uranium Occurrences
General: reconnaissance radioactivity examination of 360 coal samples from 86 mines in Allegheny, Butler, Cambria, Clarion, Clearfield, Indiana, Jefferson, Lawrence, Mercer, Somerset, and Westmoreland counties; the beds sampled were the Brookfield, Lower and Upper Clarion, Lower, Middle, and Upper Kittanning, and Lower and Upper Freeport of the Allegheny series, the Bakerstown of the Conemaugh series, and the Pittsburgh and Redstone of the Monongahela series; none of the coal beds showed more than 0.002% eU; in Clearfield county a thin bone layer overlying the Upper Freeport bed showed as much as 0.040% eU but no unusual radioactivity was shown by coal immediately above the bone layer or other coals above, below, and on either side of the locality for a distance of two miles: 995.
Clearfield Quadrangle
Krolick Coal Co. strip mine at LeContes Mills: radioactivity reported in upper 0.4 ft. of the 3.2 ft. thick Lower Freeport coal bed in the following seams, starting with the uppermost: coal in bony irregular plates, 0.033% eU, by chemical analysis, 11.9% ash and 0.041% U in sample; pyritic weathered coal, 0.009% eU, and by chemical analysis, 0.012% U in sample; weathered coal, 0.001% eU; weathered coal, less than 0.001% eU, and underlying medium gray clay, 0.003% eU; average radioactivity of the radioactive portion of this coal bed, 0.019% U; one three-inch block of coal on dump contained 0.040% U; search of immediate area in mines and outcrops for several miles around showed no additional radioactivity; source of uranium in this coal not determined: 893.

Clearfield County (contd.)
Uranium Occurrences
Houtzdale quadrangle
Mine near portal on W side of paved road about 3 mi. N of Henderson: radioactivity of flint clay in Mercer coal formation, at 2, 5, and 6 ft. from top respectively: 2 ft. from top, 0.041 mr./hr., 198 counts/minute, 0.004% eU found by conversion from assay cup-Geiger counter measurement, 0.002% eU by two radioactivity measurements in the laboratory, 0.001% U in sample, 0.001% U in ash; 5 ft. from top, 0.049 mr./hr., 131 counts/minute, 0.002% eU found by conversion from assay cup-Geiger counter measurement and 0.003% eU by two radioactivity measurements in the laboratory; 6 ft. from top, 0.045 mr./hr., 147 counts/minute, 0.003% eU found by conversion from assay cup-Geiger counter measurement and by two radioactivity measurements in the laboratory, 0.0007% U in sample, 0.0004% U in ash: 748.
Old strip pit on W side of Clearfield Creek, 2.3 mi. NE of Faunce: radioactivity of four layers of Mercer coal, with an average of 43 counts/minute for two upper layers and 89 counts/minute for all four, in a syncline: radioactivity of top 15 in., bottom 15 in., and top 9 in. of coal respectively, 0.014, 0.018, and 0.029 mr./hr., 44, 41, and 58 counts/minute, and all less than 0.001% eU found by conversion from assay cup-Geiger counter

PENNSYLVANIA (contd.)

Clearfield County (contd.)
Uranium Occurrences
Houtzdale quadrangle
Old strip pit on W side of Clearfield Creek, 2.3 mi. NE of Faunce: measurement and by radioactivity measurement in the laboratory; bottom 4 in. bony coal, 0.042 mr./hr., 159 counts/minute, 0.003% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory, 0.002% U in sample, 0.003% U in ash: 748.
Karthus quadrangle
Active strip pit about 1.8 mi. S of Keewaydin: radioactivity of Upper and Middle Kittanning coal on flank: radioactivity of 24 in. of Upper Kittanning coal, and top 9 in. and bottom 23 in. of Lower Kittanning coal respectively, 0.010, 0.022, and 0.015 mr./hr., 38, 60, and 40 counts/minute with an average of 46 counts/minute, all less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and radioactivity measurement in the laboratory except the top 9 in. of Lower Kittanning coal which showed 0.001% eU in the laboratory and 0.0004% U in sample and 0.0006% U in ash: 748.
Penfield quadrangle
Mine at face 0.7 mi. S of Chestnut Grove: radioactivity of clay underlying coal: flint clay lying directly under, and 1.5, 3, 4.5, and 6 ft. below coal respectively 0.033, 0.042, 0.038, 0.036, 0.034 mr./hr., 146, 140, 96, 97, and 105 counts/minute, 0.003, 0.003, 0.001, 0.001, 0.002% eU found by conversion from assay cup-Geiger counter measurement and 0.002, 0.002, and three 0.001% U by radioactivity measurement in the laboratory: 748.

PENNSYLVANIA (contd.)

Clearfield County (contd.)
Uranium Occurrences
Penfield quadrangle
Old strip pit 0.7 mi. S of Chestnut Grove: radioactivity of 6 layers of Mercer coal in an anticline; starting with upper layer: top 4 in. coal 0.018 mr./hr., 70 counts/minute, 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory, 0.0007% U in sample, 0.001% U in ash: bottom 23 in. and top 4 in. of coal respectively 0.015 and 0.24 mr./hr., 53 and 56 counts/minute, both less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurements in the laboratory; middle 6 in. bony coal, 0.024 mr./hr., 106 counts/minute, 0.002% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory, 0.0006% U in sample, 0.002% U in ash; bottom 7 in. of coal, 0.030 mr./hr., 117 counts/minute, 0.002% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measure in the laboratory, 0.0006% U in sample, 0.002% U in ash; 6 in. of coal, 0.028 mr./hr., 50 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.

PENNSYLVANIA (contd.)

Clearfield County (contd.)
Uranium Occurrences
Clay, Uranium-bearing
Houtzdale quadrangle
Mine near portal on W side of paved road about 3 mi. N of Henderson: radioactivity of flint clay in Mercer coal formation, at 2, 5, and 6 ft. from top respectively: 2 ft. from top, 0.041 mr./hr., 198 counts/minute, 0.004% eU found by conversion from assay cup-Geiger counter measurement 0.002% eU by two radioactivity measurements in the laboratory, 0.001% U in sample, 0.001% U in ash; 5 ft. from top, 0.049 mr./hr., 131 counts/minute, 0.002% eU found by conversion from assay cup-Geiger counter measurement and 0.003% eU by two radioactivity measurements in the laboratory; 6 ft. from top, 0.045 mr./hr., 147 counts/minute, 0.003% eU found by conversion from assay cup-Geiger counter measurement and by two radioactivity measurements in the laboratory, 0.0007% U in sample, 0.0004% U in ash: 748.
Penfield quadrangle
Mine at face 0.7 mi. S of Chestnut Grove: radioactivity of clay underlying coal: flint clay lying directly under, and 1.5, 3, 4.5, and 6 ft. below coal respectively 0.033, 0.042, 0.038, 0.036, 0.034 mr./hr., 146, 140, 96, 97, and 105 counts/minute, 0.003, 0.003, 0.001, 0.001. 0.002% eU found by conversion from assay cup-Geiger counter measurement and 0.002, 0.002, and three 0.001% U by radioactivity measurement in the laboratory: 748.

PENNSYLVANIA (contd.)

Clearfield County (contd.)
Uranium Occurrences
Coals, Uranium-bearing
General: reconnaissance radioactivity examination of 360 coal samples from 86 mines in Allegheny, Butler, Cambria, Clarion, Clearfield, Indiana, Jefferson, Lawrence, Mercer, Somerset, and Westmoreland counties; the beds sampled were the Brookfield, Lower and Upper Clarion, Lower, Middle, and Upper Kittanning, and Lower and Upper Freeport of the Allegheny series, the Bakerstown of the Conemaugh series, and the Pittsburgh and Redstone of the Monongahela series; none of the coal beds showed more than 0.002% eU; in Clearfield county a thin bone layer overlying the Upper Freeport bed showed as much as 0.040% eU but no unusual radioactivity was shown by coal immediately above the bone layer or other coals above, below, and on either side of the locality for a distance of two miles: 995.
Clearfield Quadrangle
Krolick Coal Co. strip mine at LeContes Mills: radioactivity reported in upper 0.4 ft. of the 3.2 ft. thick Lower Freeport coal bed in the following seams, starting with the uppermost: coal in bony irregular plates, 0.033% eU, and by chemical analysis, 11.9% ash and 0.041% U in sample; pyritic weathered coal, 0.009% eU, and by chemical analysis 0.012% U in sample; weathered coal, 0.001% eU;

PENNSYLVANIA (contd.)

Clearfield County (contd.)
Uranium Occurrences
Coal, U-bearing
Clearfield quadrangle
Krolick Coal. Co. strip mine at LeContes Mills: weathered coal, less than 0.001% eU, and underlying medium gray clay, 0.003% eU; average radioactivity of the radioactive portion of this coal bed, 0.019% U; one three-inch block of coal on dump contained 0.040% U; search of immediate area in mines and outcrops for several miles around showed no additional radioactivity; source of uranium in this coal not determined: 893.
Houtzdale quadrangle
Old strip pit on W side of Clearfield Creek, 2.3 mi. NE of Faunce: radioactivity of four layers of Mercer coal, with an average of 43 counts/minute for two upper layers and 89 counts/minute for all four, in a syncline: radioactivity of top 15 in., bottom 15 in., and top 9 in. of coal respectively, 0.014, 0.018, and 0.029 mr./hr., 44, 41, and 58 counts/minute, and all less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; bottom 4 in. bony coal, 0.042 mr./hr., 159 counts/minute, 0.003% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory, 0.002% U in sample, 0.003% U in ash: 748.
Karthus quadrangle
Active strip pit about 1.8 mi. S of Keewaydin: radioactivity of Upper and Middle Kittanning coal on flank: radioactivity of 24 in. in Upper Kittanning coal, and top 9 in. and bottom 23 in. of Lower Kittanning coal respectively,

PENNSYLVANIA (contd.)

Clearfield County (contd.)
Uranium Occurrences
Coal, Uranium-bearing
Karthus quadrangle
Active strip pit about 1.8 mi. S of Keewaydin: 0.010, 0.022, and 0.015 mr./hr., 38, 60, and 40 counts/minute with an average of 46 counts/minute, all less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and radioactivity measurement in the laboratory except the top 9 in. of Lower Kittanning coal which showed 0.001% eU in the laboratory and 0.0004% U in sample and 0.0006% U in ash: 748.
Penfield quadrangle
Old strip pit 0.7 mi. S of Chestnut Grove: radioactivity of 6 layers of Mercer coal in an anticline; starting with upper layer: top 4 in. coal 0.018 mr./hr., 70 counts/minute, 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory, 0.0007% U in sample, 0.001% U in ash; bottom 23 in. and top 4 in. of coal respectively 0.015 and 0.24 mr./hr., 53 counts/minute, both less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurements in the laboratory; middle 6 in. bony coal, 0.024 mr./hr., 106 counts/minute, 0.002% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory, 0.0006%

PENNSYLVANIA (contd.)

Clearfield County (contd.)
Uranium Occurrences
Coal, Uranium-bearing
Penfield quadrangle
Old strip 0.7 mi. S of Chestnut Grove:
U in sample, 0.002% U in ash; bottom 7 in. of coal 0.030 mr./hr., 117 counts/minute, 0.002% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory, 0.0006% U in sample, 0.002% U in ash; 6 in. of coal, 0.028 mr./hr., 50 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.

Coal, Uranium-bearing
See under individual county names and under Index III, Coal, Uranium-bearing-Pennsylvania: 748, 893, 995, 996.

Columbia County
Radioactive Coal
Western Middle Field
Ashland quadrangle
Abandoned strip pit in Buck Mountain coal, 1.1 mi. W of Centralia town limit, 0.3 mi. N of U.S. Highway 122: radioactivity reported for shale and coal, starting with uppermost: non-radioactive shales and coals overlying radioactive layers; medium dark-gray, carbonaceous shale 0.002% eU; two bright coals, both less than 0.001% eU; very carbonaceous shale, 0.002% eU; and moderately bright coal, less than 0.001% eU: 1011.

PENNSYLVANIA (contd.)

Columbia County (contd.)
Radioactive Rocks
Western Middle Field
Ashland quadrangle
Abandoned strip pit in Buck Mountain coal, 1.1 mi. W of Centralia town limit, 0.3 mi. N of U.S. Highway 122: radioactivity reported for shale and coal, starting with uppermost: non-radioactive shales and coals overlying radioactive layers; medium dark-gray, carbonaceous shale, 0.002% eU; two bright coals, both less than 0.001% eU; very carbonaceous shale, 0.002% eU; and moderately bright coal, less than 0.001% eU: 1011.

Columbite, Uranium-bearing
See under individual county names and under Index III, Columbite, Uranium-bearing-Pennsylvania: 1018.

Cyrtolite Occurrences
See under individual county names and under Index III, Cyrtolite Occurrences-Pennsylvania: 665, 834, 1018.

Dauphin County
Radioactive Coal
Southern Field
Lykens quadrangle
Abandoned strip pit in Mammoth coal about 1.5 mi. NW of Williamstown on N side of Big Lick Mountain: radioactivity of three bright coals, upper two separated by non-radioactive dark-gray carbonaceous shale and lower two by non-radioactive dull coal, all three less than 0.001% eU: 1011.
Abandoned strip pit in Primrose (?) coal, 1.2 mi. N of Lykens town limit: radioactivity of four coals, top two bright, third medium bright, and fourth, bright, all less than 0.001% eU: 1011.

PENNSYLVANIA (contd.)

Delaware County
Allanite Occurrences
Middletown Township
Lenni: allanite: 975
Quarry on railroad W of Lenni station: radioactive minerals present and, when given, intensity of radiograph on photographic plate: allanite: 1018.
Quarry 1/8 mile west of Lenni station: allanite in Baltimore gneiss: 665
Quarry N of Lenni station: allanite in gneiss: 766.
Springfield Township
Morton: allanite: 975.
Johnson's quarry NW of Morton station on road from Morton to Marple: allanite, questionable occurrence of euxenite, in Fairmount gneiss: 665; allanite, columbite, euxenite in granite gneiss and pegmatite: 766; radioactive minerals present and, when given, intensity of radiograph on photographic plate: columbite grains, moderately active; euxenite crystals, moderately active; allanite, crystalline masses, feebly active; cyrtolite, minute crystals, feebly active: 1018.
Autunite Occurrences
Bethel Township
Bunting's feldspar quarry NW of Boothwyn: autunite, beryl: 766.
Chester Township
Chester area, especially on banks of Crum and Ridley Creeks: autunite, torbernite, pitchblende, uranochre in granite veins in gneiss, some autunite and torbernite occurring in the gneiss as well: 908.
Chester: radioactive minerals present and, when given, intensity of radiograph on photographic plate: uraninite; uranochre (?); autunite, crystalline scales, moderately active; torbernite, crystalline scales, feebly active: 1018.

PENNSYLVANIA (contd.)

Delaware County (contd.)
Autunite Occurrences
Chester Township
Samuel Crozer's quarry on W bank of Ship Creek, a tributary of Chester Creek, between Upland road and Chester Creek: garnets coated with autunite: 911; autunite: 762; autunite: 770; autunite in Fairmount gneiss: 665; autunite, gummite, uraninite, torbernite, uraconite in gneiss and pegmatite: 766; radioactive minerals present and, when given, intensity of radiograph on photographic plate: autunite, crystalline, scales, moderately active: 1018.
Haverford Township
Railroad cut at Dickinson's Mill: autunite, gummite as pseudomorph of uraninite in Wissahickon gneiss and pegmatite: 766.
Railroad cut ½ mi. N of City Line Ave: autunite, gummite, uraninite, in Wissahickon gneiss: 665.
Llanerch, Railroad cut 1 mi. NE of: radioactive minerals present and, when given, intensity of radiograph on photographic plate: gummite; autunite: 1018.
Ridley Township: gneiss with autunite: 761.
Deshong's quarry on E side of Ridley Creek, ½ mi. W of Leiperville: autunite, torbernite, uraconite, in Fairmount gneiss:665; autunite, torbernite, and, more rarely, uranochre in granite in the gneiss: 911; pegmatite with autunite, gummite, torbernite, uraconite: 766; autunite, torbernite: 762;

PENNSYLVANIA (contd.)

Delaware County (contd.)
Autunite Occurrences
Ridley Township
Deshong's quarries W of Leiperville: radioactive minerals present and, when given, intensity of radiograph on photographic plate: autunite, crystalline, scales, moderately active; torbernite, crystalline scales, moderately active; uranochre: 1018.
Leiper's quarry on E side of Ridley Creek, ½ mi. W of Leiperville: autunite , torbernite, uraconite, in Fairmount gneiss: 665; autunite, torbernite, and, more rarely, uranochre in granite in the gneiss: 911.
Springfield Township
Leiper and Lewis quarry at Avondale on E side of Crum Creek: autunite, cyrtolite, gummite, uraconite, uraninite, uranophane, in Fairmount gneiss: 665.
Leiper's quarry at Avondale on E side of Crum Creek: cyrtolite, uraninite in crystals, and, as weathering products, autunite in yellow scales, gummite yellow and having a core of uraninite, torbernite in green scales, uraconite, and uranophane; all in pegmatite: 766; radioactive minerals present and, when given, intensity of radiograph on photographic plate: gummite, large mass, very strongly active, autunite, crystalline scales, moderately active; torbernite, crystalline scales, moderately active; uraninite, fine cubic crystals, very strongly active; cyrtolite (?), minute crystals, feebly active; uranochre (?), coating, moderately active: 1018.
Columbite, Uranium-bearing
Black Horse
John Smith's farm E of Black Horse: columbite, may contain some U: 1018.

PENNSYLVANIA (contd.)

Delaware County (contd.)
Columbite, Uranium-bearing
Middletown Township
Ahinam Smedley's farm: radioactive minerals present and, when given, intensity of radiograph on photographic plate: columbite, may contain some U; fergusonite (?): 1018.
Cyrtolite Occurrences
Aston Township
Morgan
Quarries and exposures on Chester Creek Branch of B. & W. railroad S of Morgan station: radioactive minerals present, and, when given, intensity of radiograph on photographic plate: monazite, small crystals, feebly active; cyrtolite (?), minute crystals, moderately active: 1018.
Springfield Township
Leiper and Lewis quarry at Avondale on E side of Crum Creek: autunite, cyrtolite, gummite, uraconite, uraninite, uranophane, in Fairmount gneiss: 665.
Leiper's quarry at Avondale on E side on Crum Creek: radioactive minerals present and, when given, intensity of radiograph on photographic plate: gummite, large mass, very strongly active; autunite, crystalline scales, moderately active; torbernite, crystalline scales, moderately active; uraninite, fine cubic crystals, very strongly active; cyrtolite (?), minute crystals, feebly active; uranochre (?), coating, moderately active: 1018.

PENNSYLVANIA (contd.)

Delaware County (contd.)
Cyrtolite Occurrences
Springfield Township
Morton
Johnson's quarry NW of Morton station on road from Morton to Marple: radioactive minerals present and, when given, intensity of radiograph on photographic plate: columbite, grains, moderately active; euxenite, crystals, moderately active; allanite, crystalline masses, feebly active; cyrtolite, minute crystals, feebly active: 1018.
Upper Chichester Township
Boothwyn
Feldspar pits on W side of East Branch of Naaman's Creek, SW of Boothwyn station: minute brown and yellow cyrtolite crystals, columbite, monazite, samarskite, xenotime in pegmatite: 766.
Quarry S of railroad and SW of Boothwyn station: radioactive minerals present and, when given, intensity of radiograph on photographic plate: columbite, crystals, feeble active; monazite, crystals, moderately active; cyrtolite, brown and yellow minute crystals, both feebly active: 1018.
Euxenite Occurrences
General: euxenite, location unnamed: 1018.
Aston Township
Morgan
Quarry just S of railroad station in Morgan: cyrtolite, zircon, monazite: 766.
Springfield Township
Leiper's quarry at Avondale on E side of Crum Creek: cyrtolite, uraninite in crystals, and, as weathering products, autunite in yellow scales, gummite yellow and having a core of uraninite, torbernite in green scales, uraconite, and uranophane; all in pegmatite: 766.

PENNSYLVANIA (contd.)

Delaware County (contd.)
Euxenite Occurrences
Springfield Township
Morton: euxenite: 883.
Johnson's quarry NW of Morton station on road from Morton to Marple: allanite, questionable occurrence of euxenite, in Fairmount gneiss: 665; allanite, columbite, euxenite in granite gneiss and pegmatite: 766; radioactive minerals present and, when given, intensity of radiograph on photographic plate: columbite grains, moderately active; euxenite crystals, moderately active; allanite, crystalline masses, feebly active; cyrtolite, minute crystals, feebly active: 1018.
Johnson's quarry area at Morton Road and the Baltimore Turnpike: two black crystals found between the quartz patches and biotite veins of a pegmatite dike in the Fairmount granite-gneiss; study without chemical analysis, since only two crystals were available, seemed to indicate the mineral was euxenite and was highly radioactive according to its radiographs: 832.
Fergusonite Occurrences
Middletown Township
Ahinam Smedley's farm: beryl, columbite, fergusonite: 911; questionable occurrence of fergusonite:665; radioactive minerals present and, when given, intensity of radiograph on photographic plate: columbite, may contain some U; fergusonite (?): 1018.
Area around Crump's Quarry on Mineral Hill: columbite, microlite, fergusonite, samarskite in pegmatite: 766.

PENNSYLVANIA (contd.)

Delaware County (contd.)
Gummite Occurrences
General: uraninite, gummite occur at several unnamed localities in gneiss and pegmatite: 862.
Chester Township: gummite, "uraconite," uraninite: 665.
Samuel Crozer"s quarry on W bank of Ship Creek, a tributary of Chester Creek, between Upland road and Chester Creek: autunite, gummite, uraninite, torbernite, uraconite in gneiss and pegmatite: 766.
Haverford Township
Railroad cut at Dickinson"s Mill: autunite, gummite as pseudomorph of uraninite in Wissahickon gneiss and pegmatite: 766.
Railroad cut ½ mile north of City Line Ave: autunite, gummite, uraninite, in Wissahickon gneiss: 665.
Llanerch, Railroad cut 1 mi. NE of: radioactive minerals present and, when given, intensity of radiograph on photograph plate: gummite; autunite: 1018.
Ridley Township
Deshong's quarry on E side of Ridley Creek, ½ mi. W of Leiperville: pegmatite with autunite, gummite, torbernite, uraconite: 766.
Springfield Township
Leiper and Lewis quarry at Avondale on E side of Crum Creek: autunite, cyrtolite, gummite, uraconite, uraninite, uranophane, in Fairmount gneiss: 665.
Leiper's quarry at Avondale on E side of Crum Creek: cyrtolite, uraninite in crystals, and, as weathering products, autunite in yellow scales, gummite yellow and having a core of uraninite, torbernite in green scales, uraconite, and uranophane; all in pegmatite: 766; radioactive minerals present and, when given, intensity of radiograph on photographic plate: gummite, large mass, very strongly active; autunite, crystalline scales, moderately active; torbernite, crystalline scales, moderately active; uraninite, fine cubic crystals, very strongly active; cyrtolite (?), minute crystals, feebly active; uranochre (?), coating, moderately active: 1018.

PENNSYLVANIA (contd.)

Delaware County (contd.)
Gummite Occurrences
Springfield Township
Roadside exposure on E side of Crum Creek N of Baltimore turnpike: gummite, uraninite in meta-gabbro and pegmatite: 766; trace of gummite, uraninite in pegmatite vein in hornblende gneiss: 665.
Swarthmore, Exposures along Crum Creek NW of: radioactive minerals present and, when given, intensity of radiograph on photographic plate: uraninite, small grains, very strongly active; gummite, thin coating, moderately active: 1018.
Microlite Occurrences
Middletown Township
Area around Crump's quarry on Mineral Hill: columbite, microlite, fergusonite, samarskite in pegmatite: 766.
Crump's serpentine quarry, Exposures N of, on Mineral Hill and W of Media: radioactive minerals present and, when given, intensity of radiograph on photographic plate: microlite (?), minute grains, moderately active; columbite, crystal, faintly active: 1018.
Exposures 1/8 mi. N of Crump's quarry, No. 40: microlite in pegmatite: 665.
Monazite Occurrences
Aston Township
Morgan
Quarries and exposures on Chester Creek Branch of B. and W. railroad S of Morgan station: radioactive minerals present and, when given, intensity of radiograph on photographic plate: monazite, small crystals, feebly active; cyrtolite (?), minute crystals, moderately active: 1018.

PENNSYLVANIA (contd.)

Delaware County (contd.)
Monazite Occurrences
Aston Township
Morgan
Quarry below Morgan's station on SE side of Chester Creek about 5 mi. from Chester: monazite associated with quartz, feldspar, magnetite, and green mica; first reported occurrence in state: 771.
Quarry just S of railroad station in Morgan: cyrtolite, zircon, monazite: 766; monazite in Wissahickon (?) gneiss: 665.
Upper Chichester Township
Boothwyn
Bullock's quarry on Marcus Hook Creek E of Boothwyn station: columbite, monazite in small brown crystals in apatite: 766.
Feldspar pits on W side of East Branch of Naaman's Creek, SW of Boothwyn station: minute brown and yellow cyrtolite crystals, columbite, monazite, samarskite, xenotime in pegmatite: 766.
Feldspar pits SW of Boothwyn station: questionable occurrences of monazite, xenotime in pegmatite: 665.
Quarry S of railroad and S of Boothwyn station: radioactive minerals present and, when given, intensity of radiograph on photographic plate: columbite, crystals, feebly active; monazite, crystals, moderately active; cyrtolite, brown and yellow minute crystals, both feebly active: 1018.
Pitchblende Occurrences
Avondale
Judge Leiper's quarry on W bank of Crum Creek: garnets, and more rarely lime-uranite, pitchblende, uranochre, only one specimen of latter ever found: 907.
Chester Township
Chester area, especially on banks of Crum and Ridley Creeks: autunite, torbernite, pitchblende, uranochre in granite veins in gneiss, some autunite and torbernite occurring in the gneiss as well: 908.

PENNSYLVANIA (contd.)

Delaware County (contd.)
Radioactive Columbite
Avondale
Quarry on W side of Crum Creek: radioactive minerals present and, when given, intensity of radiograph on photographic plate: columbite, crystal, feebly active: 1018.
Middletown Township
Crump's serpentine quarry, Exposures N of, on Mineral Hill and W of Media: radioactive minerals present and, when given, intensity of radiograph on photographic plate: microlite (?), minute grains, moderately active; columbite, crystal, faintly active: 1018.
Springfield Township
Morton
Johnson's quarry NW of Morton station on road from Morton to Marple: radioactive minerals present and, when given, intensity of radiograph on photographic plate: columbite, grains, moderately active; euxenite, crystals, moderately active; allanite, crystalline masses, feebly active; cyrtolite, minute crystals, feebly active: 1018.
Upper Chichester Township
Boothwyn
Quarry S of railroad and SW of Boothwyn station: radioactive minerals present and, when given, intensity of radiograph on photographic plate: columbite, crystals, feebly active; monazite, crystals, moderately active; cyrtolite, brown and yellow minute crystals, both feebly active: 1018.

PENNSYLVANIA (contd.)

Delaware County (contd.)
Samarskite Occurrences
Middletown Township
Area around Crump's quarry on Mineral Hill: columbite, microlite, fergusonite, samarskite in pegmatite: 766.
Boulders in stream bed south of Crump's quarry, No. 40: samarskite in pegmatite and serpentine: 665.
Crump's serpentine quarry on Mineral Hill, Exposures W of: radioactive minerals present and, when given, intensity of radiograph on photographic plate: samarskite (?), minute grains, moderately active: 1018.
Upper Chichester Township
Boothwyn
Feldspar pits on W side of East Branch of Naaman's Creek, SW of Boothwyn station: minute brown and yellow cyrtolite crystals, columbite, monazite, samarskite, xenotime, in pegmatite: 766.
Thorium Occurrences
General: uraninite, gummite occur at several unnamed localities in gneiss and pegmatite: 862; euxenite, location unnamed: 1018.
Aston Township
Morgan
Quarries and exposures on Chester Creek Branch of B and W railroad S of Morgan station: radioactive minerals present, and, when given, intensity of radiograph on photographic plate: monazite, small crystals, feebly active; cyrtolite (?), minute crystals, moderately active: 1018.
Quarry just S of railroad station in Morgan: cyrtolite, zircon, monazite: 766; monazite in Wissahickon (?) gneiss: 665.
Quarry below Morgan's Station on SE side of Chester Creek about 5 mi. from Chester: monazite associated with quartz, feldspar, magnetite, and green mica; first reported occurrence in state: 771.

PENNSYLVANIA (contd.)

Delaware County (contd.)
Thorium Occurrences
Avondale
Judge Leiper's quarry on W bank of Crum Creek: garnets, and more rarely lime-uranite, pitchblende, uranochre, only one specimen of latter ever found: 907.
Chester Township
Chester area, especially on banks of Crum and Ridley Creeks: autunite, torbernite, pitchblende, uranochre in granite veins in gneiss, some autunite and torbernite occurring in the gneiss as well: 908.
Chester: radioactive minerals present and, when given, intensity of radiograph on photographic plate: uraninite; uranochre (?); autunite, crystalline scales, moderately active, torbernite, crystalline scales, feebly active: 1018.
*Haverford Township
Railroad cut ½ mi. N of City Line Ave.: autunite, gummite, uraninite, in Wissahickon gneiss: 665.
Middletown Township
Ahinam Smedley's farm: beryl, columbite, fergusonite: 911; questionable occurrence of fergusonite: 665; radioactive minerals present and, when given, intensity of radiograph on photographic plate: columbite, may contain some U; fergusonite (?): 1018.
Boulders in stream bed south of Crump's quarry, No. 40: samarskite in pegmatite and serpentine: 665.

*Samuel Crozer's quarry on W bank of Ship Creek, a tributary of Chester Creek between Upland road and Chester Creek: autunite, gummite, uraninite, torbernite, uraconite in gneiss and pegmatite: 766.

PENNSYLVANIA (contd.)

Delaware County (contd.)
Thorium Occurrences
Middletown Township
Crump's serpentine quarry on Mineral Hill, Exposures W of: radioactive minerals present and, when given, intensity of of radiograph on photographic plate: samarskite (?), minute grains, moderately active: 1018.
Crump's serpentine quarry, Exposures N of, on Mineral Hill and W of Media: radioactive minerals present and, when given, intensity of radiograph on photographic plate: microlite (?), minute grains, moderately active; columbite, crystal, faintly active: 1018.
Exposures 1/8 mi. N of Crump's quarry, No. 40: microlite in pegmatite: 665.
Lenni: allanite: 975.
Quarry N of Lenni Station: allanite in gneiss: 766.
Quarry 1/8 mi. W of Lenni station: allanite in Baltimore gneiss: 665.
Quarry on railroad W of Lenni station: radioactive minerals present and, when given, intensity of radiograph on photographic plate: allanite: 1018.
Springfield Township
Leiper and Lewis quarry at Avondale on E side of Crum Creek: small amounts of uranochre, uraninite: 911.
Leiper's quarry at Avondale on E side of Crum Creek: radioactive minerals present and when given, intensity of radiograph on photographic plate: gummite, large mass, very strongly active; autunite, crystalline scales, moderately active; uraninite, fine cubic crystals, very strongly active; cyrtolite(?), minute crystals, feebly active; uranochre(?), coating, moderately active; torbernite, crystalline scales, moderately active: 1018.

PENNSYLVANIA

Delaware County (contd.)
Thorium Occurrences
Springfield Township
Morton: allanite: 975; euxenite: 883.
Johnson's quarry NW of Morton Station on road from Morton to Marple: allanite, questionable occurrence of euxenite, in Fairmount gneiss: 665; allanite, columbite, euxenite in granite gneiss and pegmatite: 766; radioactive minerals present and, when given, intensity of radiograph on photographic plate: columbite, grains, moderately active; euxenite, crystals, moderately active; allanite, crystalline masses, feebly active; cyrtolite, minute crystals, feebly active: 1018.
Johnson's quarry area at Morton Road and the Baltimore Turnpike: two black crystals found between the quartz patches and biotite veins of a pegmatite dike in the Fairmount granite-gneiss; study without chemical analysis, since only two crystals were available, seemed to indicate the mineral was euxenite and was highly radioactive according to its radiographs: 832.
Roadside exposures on E side of Crum Creek: trace of gummite, uraninite in pegmatite vein in hornblende gneiss: 665.
Swarthmore, Exposures along Crum Creek NW of: radioactive minerals present and, when given, intensity of radiograph on photographic plate: uraninite, small grains, very strongly active; gummite, thin coating, moderately active: 1018.
Upper Chichester Township
Boothwyn
Bullock's quarry on Marcus Hook Creek E of Boothwyn station: columbite, monazite in small brown crystals in apatite: 766.
Feldspar pits SW of Boothwyn station: questionable occurrence of monazite, xenotime in pegmatite: 665.

PENNSYLVANIA (contd.)

Delaware County (contd.)
Torbernite Occurrences
Chester Township
Chester area, especially on banks of Crum and Ridley Creeks: autunite, torbernite, pitchblende, uranochre in granite veins in gneiss, some autunite and torbernite occurring in the gneiss as well: 908.
Chester: radioactive minerals present and, when given, intensity of radiograph on photographic plate: uraninite; uranochre (?); autunite, crystalline scales, moderately active; torbernite, crystalline scales, feebly active: 1018.
Samuel Crozer's quarry on W bank of Ship Creek, a tributary of Chester Creek, between Upland road and Chester Creek: autunite, gummite, uraninite, torbernite, uraconite in gneiss and pegmatite: 766.
Ridley Township
Deshong's quarry on E side of Ridley Creek, ½ mi. W of Leiperville: autunite, torbernite, uraconite, in Fairmount gneiss: 665; autunite, torbernite: 762; autunite, torbernite, and, more rarely, uranochre in granite in the gneiss: 911; pegmatite with autunite, gummite, torbernite, uraconite: 766.
Deshong's quarries W of Leiperville: radioactive minerals present and, when given, intensity of radiograph on photograph plate: autunite, crystalline scales, moderately active; torbernite, crystalline scales, moderately active; uranochre: 1018.
Leiper's quarry on E side of Ridley Creek, ½ mi. W of Leiperville: autunite, torbernite, uraconite, in Fairmount gneiss: 665; autunite, torbernite, and, more rarely, uranochre in granite in the gneiss: 911.

PENNSYLVANIA (contd.)

Delaware County (contd.)
Torbernite Occurrences
Springfield Township
Leiper's quarry at Avondale on E side of Crum Creek: cyrtolite, uraninite in crystals, and, as weathering products, autunite in yellow scales, gummite yellow and having a core of uraninite, torbernite in green scales, uraconite, and uranophane; all in pegmatite: 766; radioactive minerals present and, when given, intensity of radiograph on photographic plate: gummite, large mass, very strongly active; autunite, crystalline scales, moderately active; torbernite, crystalline scales, moderately active; uraninite, fine cubic crystals, very strongly active; cyrtolite (?), minute crystals, feebly active; uranochre (?), coating, moderately active: 1018.
Leiper and Lewis quarry at Avondale on E side of Crum Creek: autunite, cyrtolite, gummite, uraconite, uraninite, uranophane, in Fairmount gneiss: 665.
Uraconite Occurrences
Avondale: uraconite; C. Frondel considers uraconite as "essentially a name without a mineral" stating that most specimens labelled uraconite in museum collections turn out to be zippeite or uranopilite: 758.
Chester Township
Chester: C. Frondel considers uraconite as "essentially a name without a mineral" stating that most specimens labelled uraconite in museum collections turn out to be zippeite or uranopilite: 758;

PENNSYLVANIA (contd.)

Delaware County (contd.)
Uraconite Occurrences
Chester Township
Chester, Quarries near: small amounts of uraconite: 770.
Samuel Crozer's quarry on W bank of Ship Creek, a tributary of Chester Creek, between Upland road and Chester Creek: autunite, gummite, uraninite, torbernite, uraconite in gneiss and pegmatite: 766.
Ridley Township
Deshong's quarry on E side of Ridley Creek, ½ mi. W of Leiperville: autunite, torbernite, uraconite in Fairmount gneiss: 665; pegmatite with autunite, gummite, torbernite, uraconite: 766.
Leiper's quarry on E side of Ridley Creek, ½ mi. W of Leiperville: autunite, torbernite, uraconite, in Fairmount gneiss: 665.
Leiperville: uraconite; C. Frondel considers uraconite as "essentially a name without a mineral" stating that most specimens labelled uraconite in museum collections turn out to be zippeite or uranopilite: 758.
Springfield Township
Leiper and Lewis quarry at Avondale on E side of Crum Creek: autunite, cyrtolite, gummite, uraconite, uraninite, uranophane in Fairmount gneiss: 665.
Leiper's quarry at Avondale on E side of Crum Creek: cyrtolite, uraninite in crystals, and, as weathering products, autunite in yellow scales, gummite yellow and having a core of uraninite, torbernite in green scales, uraconite, and uranophane; all in pegmatite: 766.

PENNSYLVANIA (contd.)

Delaware County (contd.)
Uraninite Occurrences
General: uraninite, gummite occur at several unnamed localities in gneiss and pegmatite: 862.
Chester Township: gummite, "uraconite", uraninite: 665.
Chester: small amounts of uranochre and uraninite in granitic veins in gneiss: 762; radioactive minerals present and, when given, intensity of radiograph on photographic plate: uraninite; uranochre (?); autunite, crystalline scales, moderately active; torbernite, crystalline scales, feebly active: 1018.
Peter Green's farm S of Chester Creek and W of Upland station: uraninite in Wissahickon gneiss and pegmatite: 766.
Samuel Crozer's quarry on W bank of Ship Creek, a tributary of Chester Creek, between Upland road and Chester Creek: autunite, gummite, uraninite, torbernite, uraconite in gneiss and pegmatite: 766.
Haverford Township
Railroad cut at Dickinson's Mill: autunite, gummite as pseudomorph of uraninite in Wissahickon gneiss and pegmatite: 766.
Railroad cut ½ mi. N of City Line Ave.: autunite, gummite, uraninite, in Wissahickon gneiss: 665.
Springfield Township
Leiper and Lewis quarry at Avondale on E side of Crum Creek: autunite, cyrtolite, gummite, uraconite, uraninite, uranophane, in Fairmount gneiss: 665; small amounts of uranochre, uraninite: 911.

PENNSYLVANIA (contd.)

Delaware County (contd.)
Uraninite Occurrences
Springfield Township
Leiper's quarry at Avondale on E side of Crum Creek: cyrtolite, uraninite in crystals, and, as weathering products, autunite in yellow scales, gummite yellow and having a core of uraninite, torbernite in green scales, uraconite, and uranophane; all in pegmatite: 766; radioactive minerals present and, when given, intensity of radiograph on photographic plate: gummite; large mass, very strongly active; autunite, crystalline scales, moderately active; torbernite, crystalline scales, moderately active; uraninite, fine cubic crystals, very strongly active, cyrtolite (?), minute crystals feebly active; uranochre (?), coating, moderately active: 1018.
Roadside exposure on E side of Crum Creek N of Baltimore turnpike: gummite, uraninite in meta-gabbro and pegmatite: 766.
Roadside exposures on E side of Crum Creek: trace of gummite, uraninite in pegmatite vein in hornblende gneiss: 665.
Swarthmore, Exposures along Crum Creek NW of: radioactive minerals present and, when given, intensity of radiograph on photographic plate: uraninite, small grains, very strongly active; gummite, thin coating, moderately active: 1018.
Uranite Occurrences
Avondale
Judge Leiper's quarry on W bank of Crum Creek: garnets, and more rarely, lime-uranite, pitchblende, uranochre, only one specimen of latter ever found: 907.
Chester Township
Deshong's quarry on E side of Ridley Creek, ½ mi. W of Leiperville: apatite, beryl, and very poor uranite, among minerals found: 907.

PENNSYLVANIA (contd.)

Delaware County (contd.)
Uranium Occurrences
General: uraninite, gummite occur at several unnamed localities in gneiss and pegmatite: 862; euxenite, location unnamed: 1018.
Aston Township
Morgan
Quarries and exposures on Chester Creek Branch of B. and W. railroad S of Morgan station: radioactive minerals present, and, when given, intensity of radiograph on photographic plate: monazite, small crystals, feebly active; cyrtolite (?), minute crystals, moderately active: 1018.
Quarry just S of railroad station in Morgan: cyrtolite, zircon, monazite: 766.
Avondale: uraconite; C. Frondel considers uraconite as "essentially a name without a mineral" stating that most specimens labelled uraconite in museum collections turn out to be zippeite or uranopilite: 758.
Judge Leiper's quarry on W bank of Crum Creek: garnets, and more rarely lime-uranite, pitchblende, uranochre, only one specimen of latter ever found: 907.
Bethel Township
Bunting's feldspar quarry NW of Boothwyn: autunite, beryl: 766.
Black Horse
John Smith's farm E of Black Horse: columbite, may contain some U: 1018

PENNSYLVANIA (contd.)

Delaware County (contd.)
Uranium Occurrences
Chester Township: gummite, "uraconite", uraninite: 665.
Chester area, especially on banks of Crum and Ridley Creeks: autunite, torbernite, pitchblende, uranochre in granite veins in gneiss, some autunite and torbernite occurring in the gneiss as well: 908.
Chester: small amounts of uranochre and uraninite in granitic veins in gneiss: 762; uraconite; C. Frondel considers uraconite as "essentially a name without a mineral" stating that most specimens labelled uraconite in museum collections turn out to be zippeite or uranopilite: 758; radioactive minerals present and, when given, intensity of radiograph on photographic plate: uraninite; uranochre (?); autunite, crystalline scales, moderately active; torbernite, crystalline scales, feebly active: 1018.
Chester, Quarries near: small amounts of uraconite: 770.
Peter Green's farm S of Chester Creek and W of Upland station: uraninite in Wissahickon gneiss and pegmatite: 766.
Samuel Crozer's quarry on W bank of Ship Creek, a tributary of Chester Creek, between Upland road and Chester Creek: autunite: 762; autunite: 770; autunite in Fairmount gneiss: 665; autunite, gummite, uraninite, torbernite, uraconite in gneiss and pegmatite: 766; garnets coated with autunite: 911; radioactive minerals present and, when given, intensity of radiograph on photographic plate: autunite, crystalline scales, moderately active: 1018.
Haverford Township
Railroad cut at Dickinson's Mill: autunite, gummite as pseudomorph of uraninite, in Wissahickon gneiss and pegmatite: 766.
Railroad cut ½ mi. N of City Line Ave.: autunite, gummite, uraninite, in Wissahickon gneiss: 665.

PENNSYLVANIA (contd.)

Delaware County (contd.)
Uranium Occurrences
Llanerch, Railroad cut 1 mi. NE of: radioactive minerals present and, when given, intensity of radiograph on photographic plate: gummite; autunite: 1018.
Middletown Township
Ahinam Smedley's farm: beryl, columbite, fergusonite: 911; questionable occurrence of fergusonite: 665; radioactive minerals present, and, when given, intensity of radiograph on photographic plate; columbite, may contain some U; fergusonite (?): 1018.
Area around Crump's quarry on Mineral Hill: columbite, microlite, fergusonite, samarskite in pegmatite: 766.
Boulders in stream beds south of Crump's quarry, No. 40: samarskite in pegmatite and serpentine: 665.
Crump's serpentine quarry on Mineral Hill, Exposures W of: radioactive minerals present and, when given, intensity of radiograph on photographic plate: samarskite (?), minute grains, moderately active: 1018.
Crump's serpentine quarry, Exposures N of on Mineral Hill, and W of Media: radioactive minerals present and, when given, intensity of radiograph on photographic plate: microlite (?), minute grains, moderately active; columbite, crystal, faintly active: 1018.
Exposures 1/8 mile north of Crump's quarry, No. 40: microlite in pegmatite: 665.

Delaware County (contd.)
Uranium Occurrences
Ridley Township: gneiss with autunite: 761.
Deshong's quarry on E side of Ridley Creek, ½ mi. W of Leiperville: autunite, torbernite, uraconite, in Fairmount gneiss: 665; autunite, torbernite: 762; autunite, torbernite, and, more rarely, uranochre in granite in the gneiss: 911; apatite, beryl, and very poor uranite, among minerals found: 907; pegmatite with autunite, gummite, torbernite, uraconite: 766.
Deshong's quarries W of Leiperville: radioactive minerals present and, when given, intensity of radiograph on photographic plate: autunite, crystalline scales, moderately active; torbernite, crystalline scales, moderately active; uranochre: 1018.
Leiper's quarry on E side of Ridley Creek, ½ mi. W of Leiperville: autunite, torbernite, uraconite, in Fairmount gneiss: 665; autunite, torbernite, and, more rarely, uranochre in granite in the gneiss: 911.
Leiperville: uraconite; C. Frondel considers uraconite as "essentially a name without a mineral" stating that most specimens labelled uraconite in museum collections turn out to be zippeite or uranopilite: 758.
Springfield Township
Leiper and Lewis quarry at Avondale on E side of Crum Creek: autunite, cyrtolite, gummite, uraconite, uraninite, uranophane, in Fairmount gneiss: 665;small amounts of uranochre, uraninite: 911.

PENNSYLVANIA (contd.)

Delaware County (contd.)
Uranium Occurrences
Springfield Township
Leiper's quarry at Avondale on E side of Crum Creek: cyrtolite, uraninite in crystals, and, as weathering products, autunite in yellow scales, gummite yellow and having a core of uraninite, torbernite in green scales, uraconite, and uranophane; all in pegmatite: 766; radioactive minerals present and, when given, intensity of radiograph on photographic plate: gummite, large mass, very strongly active; autunite, crystalline scales, moderately active; torbernite, crystalline scales, moderately active; uraninite, fine cubic crystals, very strongly active; cyrtolite (?), minute crystals, feebly active; uranochre (?), coating, moderately active: 1018.
Morton: euxenite: 883.
Johnson's quarry NW of Morton station on road from Morton to Marple: radioactive minerals present and, when given, intensity of radiograph on photographic plate: columbite, grains, moderately active; euxenite, crystals, moderately active; allanite, crystalline masses, feebly active; cyrtolite, minute crystals, feebly active: 1018.
Johnson's quarry area at Morton Road and the Baltimore Turnpike: two black crystals found between the quartz patches and biotite veins of a pegmatite dike in the Fairmount granite-gneiss; study without chemical analysis, since only two crystals were available, seemed

PENNSYLVANIA (contd.)

Delaware County (contd.)
Uranium Occurrences
Springfield Township
Morton
Johnson's quarry area at Morton Road and the Baltimore Turnpike: to indicate the mineral was euxenite and was highly radioactive according to its radiographs: 832.
Roadside exposure on E side of Crum Creek N of Baltimore turnpike: gummite, uraninite in meta-gabbro and pegmatite: 766.
Roadside exposures on E side of Crum Creek: trace of gummite, uraninite in pegmatite vein in hornblende gneiss: 665.
Swarthmore, Exposures along Crum Creek NW of: radioactive minerals present and, when given, intensity of radiograph on photographic plate: uraninite, small grains, very strongly active; gummite, thin coating, moderately active: 1018.
Upper Chichester Township
Boothwyn
Armstrong's farm N of Boothwyn: small crystals of cyrtolite in gabbro and pegmatite: 766.
Feldspar pits on W side of East Branch of Naaman's Creek, SW of Boothwyn station: minute brown and yellow cyrtolite crystals, columbite, monazite, samarskite, xenotime in pegmatite: 766.
Quarry S of railroad and SW of Boothwyn station: radioactive minerals present and, when given, intensity of radiograph on photographic plate: columbite, crystals, feebly active; monazite, crystals, moderately active; cyrtolite, brown and yellow minute crystals, both feeble active: 1018.
Columbite, Uranium-bearing
Black Horse
John Smith's farm E of Black Horse: columbite, may contain some U: 1018.

PENNSYLVANIA (contd.)

Delaware County (contd.)
Uranium Occurrences
Columbite, Uranium-bearing
Middletown Township
Ahinam Smedley's farm: radioactive minerals present and, when given, intensity of radiograph on photographic plate: columbite, may contain some U; fergusonite (?): 1018.
Uranochre Occurrences
Avondale
Judge Leiper's quarry on W bank of Crum Creek: garnets, and more rarely lime-uranite, pitchblende, uranochre, only one specimen of latter ever found: 907.
Chester Township
Chester area, especially on banks of Crum and Ridley Creeks: autunite, torbernite, pitchblende, uranochre, in granite veins in gneiss, some autunite and torbernite occurring in the gneiss as well: 908.
Chester: small amounts of uranochre and uraninite in granitic veins in gneiss: 762; radioactive minerals present and, when given, intensity of radiograph on photographic plate: uraninite; uranochre (?); autunite, crystalline scales, moderately active; torbernite, crystalline scales, feebly active: 1018.
Ridley Township
Deshong's quarry on E side of Ridley Creek ½ mi. W of Leiperville: autunite, torbernite, and, more rarely uranochre, in granite in the gneiss: 911.

PENNSYLVANIA (contd.)

Delaware County (contd.)
Uranochre Occurrences
Ridley Township
Deshong's quarries W of Leiperville: radioactive minerals present and, when given, intensity of radiograph on photographic plate: autunite, crystalline scales, moderately active; torbernite, crystalline scales, moderately active; uranochre: 1018.
Leiper's quarry on E side of Ridley Creek ½ mi. W of Leiperville: autunite, torbernite, and, more rarely, uranochre in granite in the gneiss: 911.
Springfield Township
Leiper and Lewis quarry at Avondale on E side of Crum Creek: small amounts of uranochre, uraninite: 911.
Leiper's quarry at Avondale on E side of Crum Creek: radioactive minerals present and, when given, intensity of radiograph on photographic plate: gummite, large mass, very strongly active; autunite, crystalline scales, moderately active; torbernite, crystalline scales, moderately active; uraninite, fine cubic crystals, very strongly active; cyrtolite (?), minute crystals, feebly active; uranochre (?), coating, moderately active: 1018.
Uranophane Occurrences
Springfield Township
Leiper and Lewis quarry at Avondale on E side of Crum Creek: autunite, cyrtolite, gummite, uraconite, uraninite, uranophane, in Fairmount gneiss: 665.
Leiper's quarry at Avondale on E side of Crum Creek: cyrtolite, uraninite in crystals, and, as weathering products, autunite in yellow scales, gummite yellow and having a core of uraninite, torbernite in green scales, uraconite, and uranophane; all in pegmatite: 766.

PENNSYLVANIA (contd.)

Delaware County (contd.)
Xenotime Occurrences
Upper Chichester Township
Boothwyn
Feldspar pits SW of Boothwyn station: questionable occurrence of monazite, xenotime in pegmatite: 665.
Feldspar pits on W side of East Branch of Naaman's Creek, SW of Boothwyn station: minute brown and yellow cyrtolite crystals, columbite, monazite, samarskite, xenotime, in pegmatite: 766.

Euxenite Occurrences
See under individual county names and under Index III, Euxenite Occurrences-Pennsylvania: 832, 883, 1018.

Fayette County
Radioactive Coal
Brownsville quadrangle
Coal Bluff Mine of Silver Coal Co. at Coal Bluff on N bank of Monongahela River: radioactivity of Pittsburgh coal between shale and clay, less than 0.001% eU: 893.
Vesely Brothers drift mine at Gillespie: radioactivity of Pittsburgh coal, in two coals separated by clay, both less than 0.001% eU: 893.
Wilbur Kifer's drift mine, 3.7 mi. E of Brownsville and 1.1 mi. NE of Grindstone: radioactivity of Waynesburg coal between bony coal and shale, less than 0.001% eU: 893.
Connellsville quadrangle
Green Coal Co. strip mine at Coldbrook: radioactivity of Pittsburgh coal between shale and bony coal, less than 0.001% eU: 893.

PENNSYLVANIA (contd.)

Fayette County (contd.)
Radioactive Coal
Donegal quadrangle
Abandoned strip mine 2 mi. SE of Laurelville: radioactivity of Mercer coal, less than 0.001% eU: 893.
Pete Weynd's drift mine, 0.6 mi. S of Buchanan: radioactivity of Upper Freeport coal between shale and clay less than 0.001% eU: 893.
Masontown quadrangle
Bridgeview Coal Co. strip mine, 0.6 mi. NW of center of Fairchance: radioactivity of Redstone coal with gray shale parting above base, less than 0.001% eU: 893.
Krewlach's strip mine, 4.6 mi. SE of Republic and 7.3 mi. NE of Masontown: radioactivity of Pittsburgh coal, in both coal with pyrite stringers and underlying light gray clay, both less than 0.001% eU: 893.
Ponteraro & Sons strip mine, 1.9 mi. S of center of Masontown: radioactivity of Sewickley coal between shale and clay, less than 0.001% eU: 893.
Ponteraro & Sons strip mine 2.5 mi. SE of Masontown and 3.3 mi. NE of Greensboro: radioactivity of Pittsburgh coal in both coal and overlying coal interbedded with gray shale, both less than 0.001% eU: 893.

PENNSYLVANIA (contd.)

Fergusonite Occurrences
See under individual county names and under Index III, Fergusonite Occurrences-Pennsylvania: 665, 911, 975, 1018.

Fulton County
Radioactive Coal
Broad Top quadrangle
Rockhill Coal Co. strip mine at Alvan: radioactivity of Barnett Bastard coal, a correlative of Lower Kittanning coal, in two coals separated by shale, both less than 0.001% eU: 893.

PENNSYLVANIA (contd.)

Geophysical Exploration (Airborne)
See under individual county names and under Index III, Geophysical Exploration (Airborne)-Pennsylvania: 1005, 1075, 1076, 1086.

Greene County
Radioactive Coal
Waynesburg quadrangle
Edward Johnson's strip mine WSW of center of Jefferson and 0.4 mi. due W of S fork Ten Mile Creek: radioactivity of Waynesburg coal in two coals separated by clay, less than 0.001% eU: 893.

Gummite Occurrences
See under individual county names and under Index III, Gummite Occurrences-Pennsylvania: 661, 665, 669, 862, 865, 1012, 1013, 1018.

PENNSYLVANIA (contd.)

Huntingdon County
Monazite Occurrences
Tussey Mountain, two localities SE of: radioactivity determinations were made on five shales, sandstones, and quartzite to see if the method might supply additional information for stratigraphic correlation; specimens were collected at both localities and tested with Geiger counters; samples found to be radioactive were the Tuscarora quartzite of the Basal Silurian formation and the Keefer sandstone of the Clinton formation, all of which contained abundant zircon grains in amounts equal to 10 to 15% of total heavy minerals, and tourmaline, and evidences of minerals like monazite and xenotime; even the active samples are very low in radioactivity with the Ra equivalent not exceeding the order of magnitude of 5×10^{-14} g. Ra/g. rock; the zircon content is probably responsible for whatever radioactivity is present, in future studies, core samples should be used rather than outcrop samples to eliminate the effect of weathering on the radioactivity of the original rock material; description of methods and apparatus used: 825, 826.
Radioactive Coal
Broad Top quadrangle
Rockhill Coal Co. strip mine, ½ mi. SW of Robertsdale: radioactivity of Fulton coal bed, a correlative of Clarion coal, two coals separated by 0.3 ft. coal-shale parting, less than 0.001% eU: 893.

PENNSYLVANIA (contd.)

Huntingdon County (contd.)
Radioactive Rocks
Entriken, 4 mi. NW of, on E slope of Tussey Mountain: radiometric analysis in laboratory of grab sample of Keefer sandstone (Clinton iron ore), oolitic hematite, radioactivity 0.001% eU, 0.001% U, and 0.9% P_2O_5: 935.
Mount Union: radiometric analysis in laboratory of Lower Bloomsburg ferruginous sandstone, radioactivity of grab sample, 0.001% eU; no analysis for U or P_2O_5: 935.
Tussey Mountain, two localities SE of: radioactivity determinations were made on five shales, sandstones, and quartzite to see if the method might supply additional information for stratigraphic correlation; specimens of Tuscarora quartzite of Basal Silurian formation, Castanea sandstone, Rose Hill shale, and Keefer sandstone, all three of the Clinton formation, and Bloomsburg shale of the Basal Cayugan formation were collected at both localities and tested with Geiger counters; samples found to be radioactive were the Tuscarora quartzite, Castanea sandstone, and Keefer sandstone, all of which contained abundant zircon grains in amounts equal to 10 to 15% of total heavy minerals, and tourmaline, and evidences of minerals like monazite and xenotime; in the non-radioactive samples, namely the Rose Hill shale and Bloomsburg shale, zircon was present in trace amounts in the Bloomsburg shale but absent in the Rose Hill shale, and neither shale contained any tourmaline or evidences of such minerals as monazite and xenotime; even the active samples

PENNSYLVANIA (contd.)

Huntingdon County (contd.)
Radioactive Rocks
Tussey Mountain:
are very low in radioactivity with the Ra equivalent not exceeding the order of magnitude of 5×10^{-14} g. Ra/g. rock; the zircon content is probably responsible for whatever radioactivity is present; in future studies, core samples should be used rather than outcrop samples to eliminate the effect of weathering on the radioactivity of the original rock material; description of methods and apparatus used: 825, 826.
Radioactivity Determinations
Rocks
Entriken, 4 mi. NW of, on E slope of Tussey Mountain: radiometric examination in laboratory of grab sample of Keefer sandstone, a ferruginous sandstone, no radioactivity found; no analysis for U or P_2O_5: 935.
Huntingdon, 9 mi. NW of: radiometric examination of Keefer sandstone(?), dark red sandstone; no radioactivity value found, no analysis for U or P_2O_5: 935.
Mount Union: radiometric examination in the field of Clinton group sandstones and shales, no radioactivity found, no samples analyzed: 935.
Shade Gap, ½ mi. NW of: radiometric field examination of Keefer sandstone(?), ferruginous sandstone, no radioactivity found; no samples analyzed: 935.
Shirleysburg, 2 mi. E of: radiometric examination in laboratory of grab sample of Marcellus ore sandstone with much hematite; no radioactivity found; no analyses for U or P_2O_5: 935.

PENNSYLVANIA (contd.)

Huntingdon County (contd.)
Radioactivity Determinations
Rocks
University Park (formerly State College), 8 mi. S of: radiometric analysis in laboratory of grab sample of Keefer sandstone (Clinton iron ore), oolitic hematite, no radioactivity found; no analysis for U or P_2O_5: 935.
Thorium Occurrences
Tussey Mountain, two localities SE of: radioactivity determinations were made on five shales, sandstones, and quartzite to see if the methods might supply additional information for stratigraphic correlation; specimens were collected at both localities and tested with Geiger counters; samples found to be radioactive were the Tuscarora quartzite of the Basal Silurian formation and Castanea sandstone, and Keefer sandstone of the Clinton formation, all of which contained abundant zircon grains in amounts equal to 10 to 15% of total heavy minerals, and tourmaline, and evidences of minerals like monazite and xenotime; even the active samples are very low in radioactivity with the Ra equivalent not exceeding the order of magnitude of 5×10^{-14} g. Ra/g. rock; the zircon content is probably responsible for whatever radioactivity is present; in future studies, core samples should be used rather than outcrop samples to eliminate the effect of weathering on the radioactivity of the original rock material; description of methods and apparatus used: 825, 826.

PENNSYLVANIA (contd.)

Huntingdon County (contd.)
Xenotime Occurrences
Tussey Mountain, two localities SE of: radioactivity determinations were made on five shales, sandstones, and quartzite to see if the methods might supply additional information for stratigraphic correlation; specimens were collected at both localities and tested with Geiger counters; samples found to be radioactive were the Tuscarora quartzite of the Basal Silurian formation and the Castanea sandstone and Keefer sandstone of the Clinton formation, all of which contained abundant zircon grains in amounts equal to 10 to 15% of total heavy minerals, and tourmaline, and evidences of minerals like monazite and xenotime; even the active samples are very low in radioactivity with the Ra equivalent not exceeding the order of magnitude of 5×10^{-14} g. Ra/g. rock; the zircon content is probably responsible for whatever radioactivity is present; in future studies, core samples should be used rather than outcrop samples to eliminate the effect of weathering on the radioactivity of the original rock material; description of methods and apparatus used: 825, 826.

Hyalite, Uranium-bearing
See under individual county names and under Index III, Hyalite, Uranium-bearing-Pennsylvania: 911, 1018.

PENNSYLVANIA (contd.)

Indiana County
Radioactive Coal
Indiana quadrangle
George T. Brown Coal Co. strip mine, 2.2 mi. E of Homer City: radioactivity of Upper Freeport coal in two coals separated by bony coal and overlain and underlain by shales, both less than 0.001% eU: 893.
Raglani Coal Co. strip mine, 2 mi. N of Brush Valley: radioactivity of Upper Freeport coal between siltstone and clay, less than 0.001% eU: 893.
Sipos Coal Co. mine No. 3, drift mine, 2.5 mi. E of Homer City: radioactivity of Lower Kittanning coal between bony coal and shale, less than 0.001% eU: 893.
New Florence quadrangle
K. & D. Coal Co. strip mine, 2 mi. SE of Palmerton: radioactivity of Lower Freeport coal between shale and clay, less than 0.001% eU: 893.
Lowhead Coal Co. drift mine, 2.2 mi. E of Bolivar: radioactivity of Lower Freeport coal between canneloid shale and impure coal, less than 0.001% eU: 893.
Murphy Coal Co. strip mine, 1 mi. E of Palmerton: radioactivity of Upper Freeport coal in two coals separated by discontinuous shale parting, both less than 0.001% eU: 893.
Raglani Coal Co. strip mine, 1 mi. N of Armagh: radioactivity of Lower Freeport coal between shale and clay, less than 0.001% eU: 893.

PENNSYLVANIA (contd.)

Indiana County (contd.)
Radioactive Coal
New Florence quadrangle
Wm. H. Hutzel Coal Co. drift mine, 1.7 mi. N of Armagh: radioactivity of Lower Freeport coal, in two coals separated by gray shale with root slicks, both less than 0.001% eU: 893.

Iron Deposits, Uranium-bearing
See under individual county names and under Index III, Iron Deposits, Uranium-bearing-Pennsylvania: 1005.

Juniata County
Radioactive Rocks
Honey Grove: radiometric examination in the field of Clinton group red shales and sandstones, no radioactivity found; no analysis for U or P_2O_5: 935.

Jefferson County
Coal, Uranium-bearing
Smicksburg quadrangle
Old strip pit, 2.3 mi. NW of Hamilton: radioactivity of Lower Freeport Rider coal and clay from high wall of pit: Rider coal, 0.030 mr/hr, 142 counts/minute, 0.003% eU found by conversion from assay cup-Geiger counter measurement and by two radioactivity measurements in the laboratory; 0.002% U in sample, 0.002% U in ash; top 5 in. of underclay, 0.028 mr/hr, 115 counts/minute, 0.002% eU found by conversion from assay cup-Geiger counter measurement and 0.002 and 0.003% eU by two radioactivity measurements in the laboratory: 748.

PENNSYLVANIA (contd.)

Jefferson County (contd.)
Coal, Uranium-bearing
Smicksburg quadrangle
Old strip pit, 1.1 mi. SE of Dora: radioactivity of coal, shale, and clay in Lower Freeport Rider coal in high wall of pit: 2 in. of shale overlying coal, 0.029 mr/hr, 57 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and 0.003% eU by two radioactivity measurements in the laboratory; coal, 0.026 mr/hr, 179 counts/minute, 0.004% eU found by conversion from assay cup-Geiger counter measurement and 0.004 and 0.006% eU by two radioactivity measurements in the laboratory; 0.002% U in sample, and 0.003% U in ash; top 2 in. of underclay, 0.024 mr/hr, 130 counts/minute, 0.002% eU found by conversion from assay cup-Geiger counter measurement and by two radioactivity measurements in the laboratory: 748.
Radioactive Clay
Brookville quadrangle
Old roadcut on S side of Pennsylvania Highway 28, 0.8 mi. W of Summerville: radioactivity of shale, coal, and clay in Lower Freeport coal in a syncline: dark shale, 6 in. at top of Lower Freeport coal, 0.032 mr/hr, 183 counts/minute, 0.004% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; Lower Freeport coal, total 8 in. and bottom 4 in. respectively, 0.022 and 0.028 mr/hr, 66 and 67 counts/minute, and both less than 0.001% eU found by conversion from assay cup-Geiger

PENNSYLVANIA (contd.)

Jefferson County (contd.)
Radioactive Clay
Brookville quadrangle
Old roadcut on S side of Pennsylvania Highway 28: counter measurement and by radioactivity measurement in the laboratory; top 6 in. of underclay, 0.031 mr/hr, 116 counts/minute, 0.002% eU found by conversion from assay cup-Geiger counter measurement and less than 0.001% eU by radioactivity measurement in the laboratory: 748.
Dubois quadrangle
Cramer mine, near face, Stump Creek: radioactivity of Lower Freeport coal and clay: top 16 in. and bottom 14 in. of coal respectively, 0.022 and 0.026 mr/hr, 35 and 40 counts/minute, or an average of 37 counts/minute for the coal bed, both less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; top 3 in. underclay, 0.031 mr/hr, 129 counts/minute, 0.002% eU found by conversion from assay cup-Geiger counter measurement, less than 0.001% eU by radioactivity measurement in the laboratory: 748.
Smicksburg quadrangle
Old strip pit, 2.3 mi. NW of Hamilton: radioactivity of Lower Freeport Rider coal and clay from high wall of pit: Rider coal, 0.030 mr/hr, 142 counts/minute, 0.003% eU found by conversion from assay cup-Geiger counter measurement and by two radioactivity measurements in the laboratory; 0.002% U in sample, 0.002% U in ash; top 5 in. of underclay, 0.028 mr/hr, 115 counts/minute, 0.002%eU found by conversion from assay cup-Geiger

PENNSYLVANIA (contd.)

Jefferson County (contd.)
Radioactive Clay
Smicksburg quadrangle
Old strip pit:
counter measurement and 0.002 and 0.003% eU by two radioactivity measurements in the laboratory: 748.
Old strip pit, 1.1 mi. SE of Dora: radioactivity of coal, shale, and clay in Lower Freeport Rider coal in high wall of pit: 2 in. of shale overlying coal, 0.029 mr/hr, 57 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and 0.003% eU by two radioactivity measurements in the laboratory; coal, 0.026 mr/hr, 179 counts/minute, 0.004% eU found by conversion from assay cup-Geiger counter measurement and 0.004 and 0.006% eU by two radioactivity measurements in the laboratory; 0.002% U in sample, and 0.003% U in ash; top 2 in. of underclay, 0.024 mr/hr, 130 counts/minute, 0.002% eU found by conversion from assay-cup Geiger counter measurement and by two radioactivity measurements in the laboratory: 748.
Radioactive Coal
Brookville quadrangle
Cut to old mine portal on N side of Pennsylvania Highway 28, 0.9 mi. E of Summerville: radioactivity of Brookville coal in a syncline: top 11 in. of coal, 0.014 mr/hr, 43 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; bottom 22 in. of coal,

PENNSYLVANIA (contd.)

Jefferson County (contd.)
Radioactive Coal
Brookville quadrangle
Cut to old mine portal on N side of Pennsylvania Highway 28: 0.014 mr/hr, 36 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.
Old roadcut on N side of Pennsylvania Highway 58, 0.5 mi. W of Summerville: radioactivity of Middle Kittanning coal in a syncline, 0.022 mr/hr, 41 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.
Old roadcut on S side of Pennsylvania Highway 28, 0.8 mi. W of Summerville: radioactivity of shale, coal and clay in Lower Freeport coal in a syncline: dark shale, 6 in. at top of Lower Freeport coal, 0.032 mr/hr, 183 counts/minute, 0.004% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; Lower Freeport coal, total 8 in. and bottom 4 in. respectively, 0.022 and 0.028 mr/hr, 66 and 67 counts/minute, and both less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; top 6 in. of underclay, 0.031 mr/hr, 116 counts/minute, 0.002% eU found by conversion from assay cup-Geiger counter measurement and less than 0.001% eU found by radioactivity measurement in the laboratory: 748.

PENNSYLVANIA (contd.)

Jefferson County (contd.)
Radioactive Coal
Brookville quadrangle
Old roadcut at Worthville on N side of road to Cool Spring: radioactivity of Lower Kittanning coal, top 16 in. and bottom 16 in. respectively, both 0.015 mr/hr, 41 and 94 counts/minute or an average of 68 counts/minute in the coal bed, less than 0.001 and 0.001% eU found by conversion from assay cup-Geiger counter measurement and both less than 0.001% eU by radioactivity measurement in the laboratory: 748.
Old strip pit, 1.1 mi. E of Worthville: radioactivity of Upper Kittanning coal in syncline; top 26 in., middle 26 in., and bottom 7 in. respectively, 0.010, 0.010, and 0.012 mr/hr, 39, 36, and 33 counts/minute or an average of 37 counts/minute for the coal bed, and for each less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; fusain lens 2 ft. from base, 0.012 mr/hr, 61 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.
Old strip pit, 1.9 mi. N of Sprankle Mills: radioactivity of Lower Freeport coal in a syncline, total 28 in. and bottom 4 in. of coal respectively, 0.012 and 0.018 mr/hr, 40 counts/minute, for both, and both less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.

PENNSYLVANIA (contd.)

Jefferson County (contd.)
Radioactive Coal
Brookville quadrangle
Old strip pit on E side of paved road 1 mi. S of Corsica: radioactivity of Upper Clarion coal and underlying Lower Clarion coal in an anticline; Upper Clarion coal, 0.016 mr/hr, 57 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; Lower Clarion coal, top 14 in. and bottom 21 in. respectively, 0.010 and 0.012 mr/hr, 32 and 38 counts/minute, or an average of 36 counts/minute for the coal bed, and both less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.
Old roadcut on N side of Pennsylvania Highway 28, 0.6 mi. E of Summerville: radioactivity of Mercer coal, 0.023 mr/hr, 80 counts/minute, 0.001% eU found by conversion from assay cup-Geiger counter measurement and by two radioactivity measurements in the laboratory: 748.
Old strip pit on S side of railroad 1 mi. SE of Conifer: radioactivity of shale and coal in Middle Kittanning coal in an anticline: shale, 6 in. of, top of coal, 0.022 mr/hr, 136 counts/minute, 0.002% eU found by conversion from assay cup-Geiger counter measurement, no other measurement made; total 27 in. of coal, 0.018 mr/hr, 51 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.

PENNSYLVANIA (contd.)

Jefferson County (contd.)
Radioactive Coal
Brookville quadrangle
Old strip pit on W side of Pennsylvania Highway 236, 0.7 mi. from junction with U. S. Highway 322 near Brookville: radioactivity of Mercer coal in syncline; top 18 in. of coal, no scintillometer reading taken, 46 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; bottom 8 in. of coal, no scintillometer reading taken, 72 counts/minute, 0.001% eU found by conversion from assay cup-Geiger counter measurement and less than 0.001% eU found by radioactivity measurement in the laboratory; 54 counts/minute was average for coal bed: 748.
Roadcut on N side of Worthville: radioactivity of Lower Kittanning coal, 0.001% eU: 994.
Stream cut 0.9 mi. SW of depot at Summerville: radioactivity of Upper and Lower Clarion coal in a syncline: Upper Clarion coal, total 6 in., no scintillometer reading taken, 59 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; top 17 in. and bottom 21 in. of Lower Clarion coal respectively, 0.012 and 0.015 mr/hr, 30 and 33 counts/minute or an average of 32 counts/minute for the coal bed, and both less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.

PENNSYLVANIA (contd.)

Jefferson County (contd.)
Radioactive Coal
Dubois quadrangle
Cramer mine, near face, Stump Creek: radioactivity of Lower Freeport coal and clay; top 16 in. and bottom 14 in. of coal respectively, 0.022 and 0.026 mr/hr, 35 and 40 counts/minute or an average of 37 counts/minute for the coal bed, both less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; top 3 in. of underclay, 0.031 mr/hr, 129 counts/minute, 0.002% eU found by conversion from assay cup-Geiger counter measurement, less than 0.001% eU found by radioactivity measurement in the laboratory: 748.
High wall of active strip mine, 2.6 mi. SW of Reynoldsville: radioactivity of Upper Kitanning coal in an anticline, no scintillometer reading taken, 77 counts/minute, 0.001% eU found by conversion from assay cup-Geiger counter measurement, less than 0.001% eU by radioactivity measurement in the laboratory: 748.
Mine near portal on N side of paved road 0.2 mi. E of Westville: radioactivity of Freeport coal in syncline, 0.018 mr/hr, 43 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.

PENNSYLVANIA (contd.)

Jefferson County (contd.)
Radioactive Coal
Smicksburg quadrangle
Active strip pit 1.2 mi. SW of Sprankle Mills: radioactivity of Lower Kitanning coal in an anticline, 0.015 mr/hr, 28 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748; radioactivity of Middle Kittanning coal from high wall of pit, 0.018 mr/hr, 41 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.
Old strip pit 1.3 mi. N of Timblin: radioactivity of Upper Kittanning coal in a syncline, 0.010 mr/hr, 29 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.
Old strip pit 2.3 mi. NW of Hamilton: radioactivity of Lower Freeport coal on flank; upper split, divided into three sections with an average of 52 counts/minute for the coal bed, top 6 in. of coal 0.022 mr/hr, 105 counts/minute, 0.002% eU found by conversion from assay cup-Geiger counter measurement, 0.001% eU by radioactivity measurement in the laboratory; middle 9 in. and bottom 8 in. of coal respectively, both 0.013 mr/hr, 48 and 37 counts/minute, both less than 0.001% eU found by conversion from

PENNSYLVANIA (contd.)

Jefferson County (contd.)
Radioactive Coal
Smicksburg quadrangle
Old strip pit 2.3 mi. NW of Hamilton:
assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; lower split, bottom 24 in. of coal, 0.009 mr/hr, 28 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748; radioactivity of Lower Freeport Rider coal and clay from high wall of pit; Rider coal, 0.030 mr/hr, 142 counts/minute, 0.003% eU found by conversion from assay cup-Geiger counter measurement and by two radioactivity measurements in the laboratory; 0.002% U in sample, 0.002% U in ash; top 5 in. of underclay, 0.028 mr/hr, 115 counts/minute, 0.002% eU found by conversion from assay cup-Geiger counter measurement and 0.002 and 0.003% eU by two radioactivity measurements in the laboratory: 748.
Old strip pit 1.1 mi. SE of Dora: radioactivity of Upper Freeport coal in an anticline, 0.012 mr/hr, 36 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748; radioactivity of coal, shale, and clay in Lower Freeport Rider coal in high wall of pit: 2 in. of shale overlying coal, 0.029 mr/hr, 57 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and 0.003% eU by two radioactivity measurements in the laboratory; coal, 0.026 mr/hr,

PENNSYLVANIA (contd.)

Jefferson County (contd.)
Radioactive Coal
Smicksburg quadrangle
Old strip pit 1.1 mi. SE of Dora: 179 counts/minute, 0.004% eU found by conversion from assay cup-Geiger counter measurement and 0.004 and 0.006% eU by two radioactivity measurements in the laboratory; 0.002% U in sample, and 0.003% U in ash; top 2 in. of underclay, 0.024 mr/hr, 130 counts/minute, 0.002% eU found by conversion from assay cup-Geiger counter measurement and by two radioactivity measurements in the laboratory: 748.
Radioactive Rocks
Brookville quadrangle
Old railroad cut on E side of railroad, 0.9 mi. S of Knoxdale: radioactivity of dark shale about 18 ft. above Lower Kittanning coal in an anticline, 0.030 mr/hr, 122 counts/minute, 0.002% eU found by conversion from assay cup-Geiger counter measurement, and less than 0.001% eU by radioactivity measurement in the laboratory: 748.
Old roadcut on S side of Pennsylvania Highway 28, 0.8 mi. W of Summerville: radioactivity of shale, coal, and clay in Lower Freeport coal in a syncline: dark shale, 6 in. at top of Lower Freeport coal, 0.032 mr/hr, 183 counts/minute, 0.004% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; Lower Freeport

PENNSYLVANIA (contd.)

Jefferson County (contd.)
Radioactive Rocks
Brookville quadrangle
Old roadcut on S side of Pennsylvania Highway 28: coal, total 8 in. and bottom 4 in. respectively, 0.022 and 0.028 mr/hr, 66 and 67 counts/minute, and both less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory; top 6 in. of underclay, 0.031 mr/hr, 116 counts/minute, 0.002% eU found by conversion from assay cup-Geiger counter measurement and less than 0.001% eU by radioactivity measurement in the laboratory: 748.
Old strip pit on S side of railroad 1 mi. SE of Conifer: radioactivity of shale and coal in Middle Kittanning coal in an anticline: shale, 6 in. of, on top of coal, 0.022 mr/hr, 136 counts/minute, 0.002% eU found by conversion from assay cup-Geiger counter measurement, no other measurement made; total 27 in. of coal, 0.018 mr/hr, 51 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and by radioactivity measurement in the laboratory: 748.
Old strip pit on W side of earth road 0.7 mi. NW of Stanton: radioactivity of dark shale overlying Lower Kittanning coal in an anticline; shale lying 15 ft. and 3 ft. over the coal respectively, both 0.032 mr/hr, 128 and 144 counts/minute, 0.002 and 0.003% eU found by conversion from assay cup-Geiger counter measurement and both less than 0.001% eU by radioactivity measurement in the laboratory: 748.

PENNSYLVANIA (contd.)

Jefferson County (contd.)

Radioactive Rocks

Smicksburg quadrangle

Old strip pit 1.1 mi. SE of Dora: radioactivity of coal, shale, and clay in Lower Freeport Rider coal in high wall of pit: 2 in. of shale overlying coal, 0.029 mr/hr, 57 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and 0.003% eU by two radioactivity measurements in the laboratory; coal, 0.026 mr/hr, 179 counts/minute, 0.004% eU found by conversion from assay cup-Geiger counter measurement and 0.004 and 0.006% eU by two radioactivity measurements in the laboratory; 0.002% U in sample, and 0.003% U in ash; top 2 in. of underclay, 0.024 mr/hr, 130 counts/minute, 0.002% eU found by conversion from assay cup-Geiger counter measurement and by two radioactivity measurements in the laboratory: 748.

Uranium Occurrences

Smicksburg quadrangle

Old strip pit 2.3 mi. NW of Hamilton: radioactivity of Lower Freeport Rider coal and clay from high wall of pit: Rider coal, 0.030 mr/hr, 142 counts/minute, 0.003% eU found by conversion from assay cup-Geiger counter measurement and by two radioactivity measurements in the laboratory; 0.002% U in sample, and 0.002% U in ash; top 5 in. of underclay, 0.028 mr/hr, 115 counts/minute, 0.002% eU found by conversion from assay cup-Geiger counter measurement and 0.002 and 0.003% eU by two radioactivity measurements in the laboratory: 748.

PENNSYLVANIA (contd.)

Jefferson County (contd.)

Uranium Occurrences

Smicksburg quadrangle

Old strip pit 1.1 mi. SE of Dora: radioactivity of coal, shale, and clay in Lower Freeport Rider coal in high wall of pit: 2 in. of shale overlying coal, 0.029 mr/hr, 57 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and 0.003% eU by two radioactivity measurements in the laboratory; coal, 0.026 mr/hr, 179 counts/minute, 0.004% eU found by conversion from assay cup-Geiger counter measurement and 0.004 and 0.006% eU by two radioactivity measurements in the laboratory; 0.002% U in sample and 0.003% U in ash; top 2 in. of underclay, 0.024 mr/hr, 130 counts/minute, 0.002% eU found by conversion from assay cup-Geiger counter measurement and by two radioactivity measurements in the laboratory: 748.

PENNSYLVANIA (contd.)

Jefferson County (contd.)
Uranium Occurrences
Coal, Uranium-bearing
Smicksburg quadrangle
Old strip pit 2.3 mi. NW of Hamilton: radioactivity of Lower Freeport Rider coal and clay from high wall of pit: Rider coal, 0.030 mr/hr, 142 counts/minute, 0.003% eU found by conversion from assay cup-Geiger counter measurement and by two radioactivity measurements in the laboratory; 0.002% U in sample, and 0.002% U in ash; top 5 in. of underclay, 0.028 mr/hr, 115 counts/minute, 0.002% eU found by conversion from assay cup-Geiger counter measurement and 0.002 and 0.003% eU by two radioactivity measurements in the laboratory: 748.
Old strip pit 1.1 mi. SE of Dora: radioactivity of coal, shale, and clay in Lower Freeport Rider coal in high wall of pit: 2 in. of shale overlying coal, 0.029 mr/hr, 57 counts/minute, less than 0.001% eU found by conversion from assay cup-Geiger counter measurement and 0.003% eU by two radioactivity measurements in the laboratory; coal, 0.026 mr/hr, 179 counts/minute, 0.004% eU found by conversion from assay cup-Geiger counter measurement and 0.004 and 0.006% eU by two radioactivity measurements in the laboratory; 0.002% U in sample, and 0.003% U in ash; top 2 in. of underclay, 0.024 mr/hr, 130 counts/minute, 0.002% eU found by conversion from

PENNSYLVANIA (contd.)

Jefferson County (contd.)
Uranium Occurrences
Coal, Uranium-bearing
Smicksburg quadrangle
Old strip pit 1.1 mi. SE of Dora:
assay cup-Geiger counter measurement and by two radioactivity measurements in the laboratory: 748.

Kasolite Occurrences
See under individual county names and under Index III, Kasolite Occurrences-Pennsylvania: 817, 867, 995.

Lackawanna County
Radioactive Coal
Northern Field
Carbondale quadrangle
Abandoned mine in unidentified coal, 0.5 mi. E of center of Jermyn, 0.7 mi. N of Aylesworth Creek: radioactivity of sandstone and underlying coal; fine- to medium-grained sandstone, less than 0.001% eU; two bright coals, separated by unsampled bone coal, taken together, less than 0.001% eU: 1011.
Strip mine in Clark coal, 0.7 mi. N of Carbondale town limit on W side of all-weather road: radioactivity of shale and underlying coal; thin-bedded carbonaceous shale, less than 0.001% eU; three bright coals, separated by two non-radioactive bone coals, all less than 0.001% eU: 1011.

PENNSYLVANIA (contd.)

Lackawanna County (contd.)
Radioactive Coal
Northern Field
Carbondale quadrangle
Strip mine in unidentified coal, 0.6 mi. W of center of Jermyn, 0.2 mi. SW of Pennsylvania Highway 107: radioactivity of coal and shale, starting with uppermost; medium dark-gray shale, 0.001% eU; a moderately bright coal, a bone coal, and a bright coal, taken together, less than 0.001% eU; and dark-gray shale, 0.001% eU: 1011.
Olyphant quadrangle
Mine entry in Dunmore III coal, 3.0 mi. E of Throop on N side of all-weather road, 0.2 mi. N of Marshwood Reservoir Dam: radioactivity of a bright coal and two moderately bright coals, separated by non-radioactive shale, all less than 0.001% eU; radioactive coal group is overlain by non-radioactive dark-gray carbonaceous shale and underlain by non-radioactive clay, bright coal, and stigmarian shale: 1011.
Scranton quadrangle
Strip mine in New County Line coal, 2.8 mi. W of Scranton courthouse on N side of all-weather road, 0.5 mi. NW of South Keyser Ave.: radioactivity of shale and coal, starting with uppermost, dark-gray, thin-bedded shale, 0.001% eU; bright coal, less than 0.001% eU; a moderately dull and a bright coal, taken together, less than 0.001% eU; non-radioactive bone coal and shale; moderately bright coal, less than 0.001% eU; bone coal, 0.001% eU: 1011.

PENNSYLVANIA (contd.)

Lackawanna County (contd.)
Radioactive Rocks
Northern Field
Carbondale quadrangle
Abandoned mine in unidentified coal, 0.5 mi. E of center of Jermyn, 0.7 mi. N of Aylesworth Creek: radioactivity of sandstone and underlying coal; fine- to medium-grained sandstone, less than 0.001% eU; two bright coals, separated by unsampled bone coal, taken together, less than 0.001% eU: 1011.
Strip mine in Clark coal, 0.7 mi. N of Carbondale town limit on W side of all-weather road: radioactivity of shale and underlying coal; thin-bedded carbonaceous shale, less than 0.001% eU; three bright coals, separated by two non-radioactive bone coals, all less than 0.001% eU: 1011.
Strip mine in unidentified coal, 0.6 mi. W of center of Jermyn, 0.2 mi. SW of Pennsylvania Highway 107: radioactivity of coal and shale, starting with uppermost; medium dark-gray shale, 0.001% eU; a moderately bright coal, a bone coal, and a bright coal, taken together, less than 0.001% eU; and dark-gray shale, 0.001% eU: 1011.
Scranton quadrangle
Strip mine in New County Line coal, 2.8 mi. W of Scranton courthouse on N side of all-weather road, 0.5 mi. NW of South Keyser Ave.: radioactivity of shale and coal, starting with uppermost; dark-gray, thin-bedded shale, 0.001% eU; bright coal, less than 0.001% eU; a moderately dull and a bright coal, taken together, less than 0.001% eU; non-radioactive bone coal and shale; moderately bright coal, less than 0.001% eU; bone coal, 0.001% eU: 1011.

PENNSYLVANIA (contd.)

Lancaster County
Radioactive Rocks
Geiger's quarry, Octararo Creek: radioactivity determinations on a sample of serpentinite gave 0.016 x 10^{-12} g. Ra/g.: 216, 724; methods used: 724; serpentinite, petrographic description: 216.

Lawrence County
Allanite Occurrences
Princeton: allanite: 82, 1098.
Radioactive Coal
Mercer quadrangle
Pilgrim Coal Co. strip mine on E side of U. S. Highway 19, 3.3 mi. N of Harlansburg: radioactivity of Lower Kittanning coal between shale and siltstone, less than 0.001% eU: 893.
Thorium Occurrences
Princeton: allanite: 82, 1098.

Lebanon County
Magnetite, Thorium-bearing
Cornwall: Triassic magnetite ore, magnetite, maghemite, and greenish gangue, activity 22.4 x 10^{-6} cc. He/g., 31.6 x 10^{-14} g. Ra/g., 2.44 x 10^{-7} g. Th/g., and age ratio 126 m.y.: 786.
Radioactive Coal
Southern Field
Tower City quadrangle
Abandoned mine in unnamed coal 4 mi. S of Tower City on W side of Mine Run Gap: radioactivity report in coal and shale, starting with uppermost: dark-gray, carbonaceous shale, 0.002% eU; two bright, sheared coals, both less than 0.001% eU; and unevenly-bedded shale, 0.002% eU: 1011.

PENNSYLVANIA (contd.)

Lebanon County (contd.)
Radioactive Coal
Southern Field
Tower City quadrangle
Small opening in abandoned strip pit in unnamed coal 4 mi. S of Tower City, 0.3 mi. N of Mine Run Gap: radioactivity reported in coal and shale, starting with uppermost: medium, light-gray shale, 0.001% eU; two bright, sheared coals, less than 0.001% eU; and dark-gray shale, less than 0.001% eU: 1011.
Radioactive Magnetite
Cornwell: Triassic magnetite ore, magnetite, maghemite, and greenish gangue, activity, 22.4 x 10^{-6} cc. He/g., 31.6 x 10^{-14} g. Ra/g., 2.44 x 10^{-7} g. Th/g., and age ratio, 126 m.y.: 786.
Radioactive Rocks
Lickdale: radiometric analysis in laboratory of grab sample of Clinton group (Swatara iron sandstone?), ferruginous sandstone, no radioactivity found; no analysis for U or P_2O_5: 935.
Thorium Occurrences
Cornwall: Triassic magnetite ore, magnetite, maghemite, and greenish gangue, activity 22.4 x 10^{-6} cc. He/g., 31.6 x 10^{-14} g. Ra/g., 2.44 x 10^{-7} g. Th/g., and age ratio, 126 m.y.: 786.
Magnetite, Thorium-bearing
Cornwall: Triassic magnetite ore, magnetite, maghemite, and greenish gangue, activity 22.4 x 10^{-6} cc. He/g., 31.6 x 10^{-14} g. Ra/g., 2.44 x 10^{-7} g. Th/g., and age ratio, 126 m.y.: 786.

PENNSYLVANIA (contd.)

Lehigh County
Allanite Occurrences
General: allanite reported in many gneisses in South Mountain in Northampton County and probably is also present, though not reported, in Lehigh County: 863.
Allentown: allanite: 82, 1098; allanite in granite: 635.
Lehigh Mountain just S of Lehigh University: large mass of allanite: 762.
South Mountain about 2 mi. S of Allentown: vein of brownish black mineral, resembling allanite but only incompletely analyzed; may prove to be tourmaline on closer study: 863.
Thorium Occurrences
General: allanite reported in many gneisses in South Mountain in Northampton County and probably is also present, though not reported, in Lehigh County: 863.
Allentown: allanite: 82, 1098; allanite in granite: 635.
Lehigh Mountain just S of Lehigh University: large mass of allanite: 762.
South Mountain about 2 mi. S of Allentown: vein of brownish black mineral, resembling allanite but only incompletely analyzed; may prove to be tourmaline on closer study: 863.
Upper Milford Township in quarry in granite gneiss S of Vera Cruz station: traces of uraninite: 766.
Vera Cruz, Gneiss quarry 3/4 mi. E of: uraninite and small amounts of molybdenite in very dense granite and gneiss: 864.
Vera Cruz, Quarry S of railroad and 3 mi. E of: uraninite reported in this old molybdenite locality in gneiss: 863.

PENNSYLVANIA (contd.)

Lehigh County (contd.)
Uraninite Occurrences
Upper Milford Township in quarry in granite gneiss S of Vera Cruz station: traces of uraninite: 766.
Vera Cruz, Gneiss quarry 3/4 mi. E of: uraninite and small amounts of molybdenite in very dense granite and gneiss: 864.
Vera Cruz, Quarry S of railroad and 3 mi. E of: uraninite reported in this old molybdenite locality in gneiss: 863.
Uranium Occurrences
Upper Milford Township in quarry in granite gneiss S of Vera Cruz station: traces of uraninite: 766.
Vera Cruz, Gneiss quarry 3/4 mi. E of: uraninite and small amounts of molybdenite in very dense granite and gneiss: 864.
Vera Cruz, Quarry S of railroad and 3 mi. E of: uraninite reported in this old molybdenite locality in gneiss: 863.

Liebigite Occurrences
See under individual county names and under Index III, Liebigite Occurrences-Pennsylvania: 817, 867.

Luzerne County
Radioactive Coal
Eastern Middle Field
Conyngham quadrangle
Abandoned mine opening in unidentified coal, 0.4 mi. S of Pennsylvania Highway 294 at Harwood: radioactivity reported for sandstone, shale, and coal, starting with uppermost: conglomeratic sandstone, less than 0.001% eU; very carbonaceous shale, less than 0.001% eU; three bright coals, lower two separated by non-radioactive bone coal, all three less than 0.001% eU: 1011.

PENNSYLVANIA (contd.)

Luzerne County (contd.)
Radioactive Coal
Eastern Middle Field
Hazelton quadrangle
Strip pit in Mammoth coal, 3.2 mi. NE of Hazelton city hall, 0.1 mi. S of Pennsylvania Highway 940: radioactivity of coal and shale, starting with uppermost: thin-bedded shale, 0.001% eU; three bright coals, all less than 0.001% eU; and bone coal, 0.001% eU: 1011.

Northern Field
Freeland quadrangle
Strip pit in Mammoth coal, 1.6 mi. SW of center of Freeland, 0.7 mi. W of Pennsylvania Highway 940: radioactivity reported in shale and coal, starting with uppermost: dark-gray shale, 0.001% eU; non-radioactive bone coal, bright coal, and bone coal; bone coal with pyrite and two bright coals separated by unsampled bone coal, taken together, less than 0.001% eU; carbonaceous shale, 0.001% eU; two very bright coals, both less than 0.001% eU; concealed layer; two coals, both less than 0.001% eU; separated by a bone coal, 0.001% eU; concealed layer; carbonaceous shale with lense of fusain and pyrite, 0.001% eU; two bright coals separated by unsampled bone coal, taken together, less than 0.001% eU; very carbonaceous shale, 0.001% eU; bright coal, less than 0.001% eU; coal, mined out: 1011.

PENNSYLVANIA (contd.)

Luzerne County (contd.)
Radioactive Coal
Northern Field
Nanticoke quadrangle
Strip pit in unidentified coal, 1.9 mi. SW of Nanticoke town limit, 0.1 mi. S of all-weather road: radioactivity of coal and shale, starting with uppermost: non-radioactive carbonaceous shale; three bright coals, lower two separated by non-radioactive, very carbonaceous shale, all three less than 0.001% eU; non-radioactive bone coal and bright coal; dull, bony coal, 0.001% eU: 1011.

Pittston quadrangle
Roadcut exposing Ross and Top Ross coals, 0.6 mi. E of Wilkes Barre city limit on Pennsylvania Highway 115: radioactivity of coal and shale, starting with uppermost: thin-bedded grayish black shale, 0.001% eU; bright coal, less than 0.001% eU; non-radioactive bone coal, bright coal, carbonaceous shale, bright coal, dark-gray shale, and bright coal; thin-bedded silty shale, 0.002% eU; non-radioactive dull coal; two bright coals, each underlain by non-radioactive bone coal, both less than 0.001% eU; and dark-gray shale, 0.001% eU: 1011.

PENNSYLVANIA (contd.)

Luzerne County (contd.)
Radioactive Coal
Northern Field
Wilkes Barre West quadrangle
Strip mine in Baltimore coal, 2.1 mi. S of Wilkes Barre city hall, 0.2 mi. SE of U. S. Highway 209: radioactivity reported for shale, coal, and siltstone, starting with uppermost: thin-bedded carbonaceous shale, 0.001% eU; two bright coals separated by unsampled shale, taken together, less than 0.001% eU; carbonaceous shale, 0.001% eU; bright coal, less than 0.001% eU; dark-gray siltstone, 0.001% eU; one very bright and two bright coals, separated by two unsampled bone or bony coals, taken together, less than 0.001% eU; non-radioactive bony coal: 1011.
Strip pit in Red Ash coal, 0.7 mi. W of Plymouth town limit, 0.5 mi. NW of U. S. Highway 11: radioactivity reported for siltstone, coal, and shale starting with uppermost: dark-gray siltstone, 0.001% eU; five bright coals, underlain respectively by a single layer of non-radioactive carbonaceous shale, bone coal, or bone coal with pyrite, all five less than 0.001% eU; bright coal, less than 0.001% eU; bone coal, 0.001% eU; and a moderately bright and a dull coal, both less than 0.001% eU: 1011.

PENNSYLVANIA (contd.)

Luzerne County (contd.)
Radioactive Rocks
Eastern Middle Field
Hazelton quadrangle
Strip pit in Mammoth coal, 3.2 mi. NE of Hazelton city hall, 0.1 mi. S of Pennsylvania Highway 940: radioactivity of coal and shale, starting with uppermost: thin-bedded shale, 0.001% eU; three bright coals, all less than 0.001% eU; and bone coal, 0.001% eU: 1011.
Northern Field
Freeland quadrangle
Strip pit in Mammoth coal, 1.6 mi. SW of center of Freeland, 0.7 mi. W of Pennsylvania Highway 940: radioactivity reported in shale and coal, starting with uppermost: dark-gray shale, 0.001% eU; non-radioactive bone coal, bright coal, and bone coal; bone coal with pyrite and two bright coals separated by unsampled bone coal, taken together, less than 0.001% eU; carbonaceous shale, 0.001% eU; two very bright coals, both less than 0.001% eU; concealed layer; two coals, both less than 0.001% eU; separated by a bone coal, 0.001% eU; concealed layer; carbonaceous shale with lense of fusain and pyrite, 0.001% eU; two bright coals, separated by unsampled bone coal, taken together, less than 0.001% eU; very carbonaceous shale, 0.001% eU; bright coal, less than 0.001% eU; coal, mined out: 1011.

PENNSYLVANIA (contd.)

Luzerne County (contd.)
Radioactive Rocks
Northern Field
Nanticoke quadrangle
Strip pit in unidentified coal, 1.9 mi. SW of Nanticoke town limit, 0.1 mi. S of all-weather road: radioactivity of coal and shale, starting with uppermost: non-radioactive carbonaceous shale; three bright coals, lower two separated by non-radioactive, very carbonaceous shale, all three less than 0.001% eU; non-radioactive bone coal and bright coal; dull, bony coal, 0.001% eU: 1011.
Pittston quadrangle
Roadcut exposing Ross and Top Ross coals, 0.6 mi. E of Wilkes Barre city limit on Pennsylvania Highway 115: radioactivity of coal and shale, starting with uppermost: thin-bedded grayish black shale, 0.001% eU; bright coal, less than 0.001% eU; non-radioactive bone coal, bright coal, carbonaceous shale, bright coal, dark gray shale, and bright coal; thin-bedded silty shale, 0.002% eU; non-radioactive dull coal; two bright coals, each underlain by non-radioactive bone coal, both less than 0.001% eU; and dark gray shale, 0.001% eU: 1011.

PENNSYLVANIA (contd.)

Luzerne County (contd.)
Radioactive Rocks
Northern Field
Wilkes Barre West quadrangle
Strip mine in Baltimore coal, 2.1 mi. S of Wilkes Barre city hall, 0.2 mi. SE of U. S. Highway 209: radioactivity reported for shale, coal, and siltstone, starting with uppermost: thin-bedded carbonaceous shale, 0.001% eU; two bright coals separated by unsampled shale, taken together, less than 0.001% eU; carbonaceous shale 0.001% eU; bright coal, less than 0.001% eU; dark-gray siltstone, 0.001% eU; one very bright and two bright coals, separated by two unsampled bone or bony coals, taken together, less than 0.001% eU; non-radioactive bony coal: 1011.
Strip pit in Red Ash coal, 0.7 mi. W of Plymouth town limit, 0.5 mi. NW of U. S. Highway 11: radioactivity reported for siltstone, coal, and shale, starting with uppermost: dark gray siltstone, 0.001% eU; five bright coals, underlain respectively by a single layer of non-radioactive carbonaceous shale, bone coal, or bone coal with pyrite, all five less than 0.001% eU; bright coal, less than 0.001% eU; bone coal, 0.001% eU; and a moderately bright and a dull coal, both less than 0.001% eU: 1011.

PENNSYLVANIA (contd.)

Lycoming County
Radioactive Rocks
Montgomery, 4 mi. E of: radiometric examination in the field of Clinton group shales and sandstone, no radioactivity found; no analysis for U or P_2O_5: 935.

Magnetite, Thorium-bearing
See under individual county names and under Index III, Magnetite, Thorium-bearing-Pennsylvania: 786.

Magnetite, Uranium-bearing
See under individual county names and under Index III, Magnetite, Uranium-bearing-Pennsylvania: 1005.

Meta-Autunite Occurrences
See under individual county names and under Index III, Meta-Autunite Occurrences-Pennsylvania: 867.

Metatorbernite Occurrences
See under individual county names and under Index III, Metatorbernite Occurrences-Pennsylvania: 867.

Meta-Uranocircite Occurrences
See under individual county names and under Index III, Metauranocircite Occurrences-Pennsylvania: 867.

Microlite Occurrences
See under individual county names and under Index III, Microlite Occurrences-Pennsylvania: 665, 1018.

PENNSYLVANIA (contd.)

Monazite Occurrences
See under individual county names and under Index III, Thorium Occurrences-Pennsylvania: 665, 771, 825, 826, 1018.

Monroe County
Radioactive Rocks
Delaware Water Gap: radiometric examination in field of Clinton group shales, sandstones, and limestones, no radioactivity found; no analysis for U or P_2O_5: 935.
Pen Argyl, 3 mi. NW of: radiometric examination in field of Swatara iron sandstone(?), massive red sandstone, no radioactivity found; no analysis for U or P_2O_5: 935.

Montgomery County
Torbernite Occurrences
Abington Township
Smith's quarry E of railroad bridge at Edge Hill: torbernite, questionable occurrence, in Cambrian sandstone: 665.
Cheltenham Township
Heacock's quarry in Wyncote, $\frac{1}{4}$ mi. W of Jenkintown station: torbernite in Wissahickon schists: 665; torbernite in minute green plates in Wissahickon gneiss and pegmatite: 766; torbernite in minute green crystals in albite granite in Chestnut Hill schists: 911; radioactive minerals present and, when given, intensity of radiograph on photographic plate: torbernite, traces, faintly active: 1018.

PENNSYLVANIA (contd.)

Montgomery County (contd.)
Uranium Occurrences
Abington Township
Smith's quarry E of railroad bridge at Edge Hill: torbernite, questionable occurrence, in Cambrian sandstone: 665.
Cheltenham Township
Heacock's quarry in Wyncote, $\frac{1}{4}$ mi. W of Jenkintown station: torbernite in Wissahickon schists: 665; torbernite in minute green plates in Wissahickon gneiss and pegmatite: 766; torbernite in minute green crystals in albite granite in Chestnut Hill schists: 911; radioactive minerals present and, when given, intensity of radiograph on photographic plate: torbernite, traces, faintly active: 1018.

Montour County
Radioactive Rocks
Danville, 1 mi. W of: radiometric analysis of grab sample of Center iron sandstone, a massive ferruginous sandstone, no radioactivity found; no analysis for U or P_2O_5: 935.

PENNSYLVANIA (contd.)

Northampton County
Allanite Occurrences
General: allanite reported in many gneisses in South Mountain in Northampton County and probably is also present, though not reported, in Lehigh County: 863.
Bethleham: allanite: 82, 950, 1098; allanite first reported here in 1855 by Genth, who published an analysis; later found in several localities in vicinity of Bethlehem and Redington: 863, 865; zircons imbedded in allanite: 964.
Bethlehem
Lehigh Mountain near Bethlehem in Lower Saucon Township: allanite: 975; allanite in a mass weighing 100 lbs.; not an uncommon mineral in gneiss of this area: 766; radioactive minerals present and, when given, intensity of radiograph on photographic plate: allanite: 1018.
South Mountain in Lower Saucon Township near Bethlehem: allanite in syenitic gneiss: 927; allanite at several localities in gneiss: 863; allanite at several places in gneiss: 865.
South Mountain S of Redington and 5 mi. E of Bethlehem: black masses of allanite with yellowish brown crust due to decomposition; imperfect crystals: 766.
South Mountain in Lower Saucon Township W of Easton: radioactive minerals present and, when given, intensity of radiograph on photographic plate: allanite: 1018.
South Mountains in Lower Saucon Township near Bethlehem: radioactive minerals present and, when given, intensity of radiograph on photographic plate: allanite: 1018.

PENNSYLVANIA (contd.)

Northampton County (contd.)
Allanite Occurrences
Bethlehem
South Mountain in Lower Saucon Township at two locations, 5 mi. E of and 3/4 mi. N of Bethlehem: allanite in narrow veins or seams in granitic rock: 762.
Redington: allanite: 975; allanite found in several localities in the vicinity of both Bethlehem and Redington: 863; 865.
Weber's quarry in Lower Saucon, 6 mi. from Easton: allanite in crystalline gneisses: 863.
Autunite Occurrences
Easton Chestnut Hill
Williams (formerly Sherrer) quarry along Delaware River on SE slope of Chestnut Hill near Easton: autunite, carnotite, gummite, thorianite, uranophane in quarry of Precambrian Franklin limestone altered by pegmatite intrusion: 669; autunite, carnotite(?), thorianite, thorogummite, and uranophane; analysis of sample of Precambrian Franklin limestone gave 0.058% eU, 0.009% U, 0.30% Th, and 3.9×10^{-11} g. Ra/g.: 973; autunite, carnotite, thorium-gummite, uranophane in pegmatite intruded into impure Franklin dolomitic limestone: 873; pegmatite cutting across S part is radioactive and contains thorite intimately associated with specular hematite, and thin coatings of autunite(?) were found at NW corner of quarry on slickenside surfaces and joints in serpentine; the thorium and uranium minerals for which the locality is well known came from the north face of the quarry from

PENNSYLVANIA (contd.)

Northampton County (contd.)
Autunite Occurrences
Easton Chestnut Hill
Williams (formerly Sherrer) quarry:
a zone 18 in. wide dipping steeply to S parallel to foliation of serpentine but accessible part has been removed by quarrying; part of it may still crop out but would be about 75 ft. up quarry face; another zone along W face of quarry is radioactive and rich in phlogopite but no radioactive minerals have been separated from this material; 843; pegmatites intrude limestone and contain autunite, thorianite, thorogummite, uranophane: 861; thorianite, thought by Gehman to be pitchblende or uraninite when he discovered it there but identified here as thorianite by U.S.G.S. analyses; analysis of thorianite, average of two samples, gave 4.44% UO_2, 33.15% UO_3, 2.49% rare earths, 31.50% U, and 33.81% Th; analysis for one alteration product, clarkeite or gummite or thorium gummite, gave 42.70% U_3O_8, 25.06% ThO_2, 5.10% rare earths, 36.21% U, and 22.03% Th; age determination by Pb, U, Th method gave Precambrian; fracture planes in serpentine also coated with autunite, carnotite: 1012; 1013; uranotil as tiny, needle-like, brilliant yellow crystals in a fissure in tremolite; autunite, thorianite, and other unnamed radioactive minerals: 983; uranium minerals present including thorianite, thorogummite, uranophane, autunite, and a carnotite-like mineral, in serpentine in a very narrow zone: 759.
Clarkeite Occurrences
Easton
Chestnut Hill
Williams (formerly Sherrer) quarry: clarkeite or gummite in serpentine; chemical analysis: 1012.

PENNSYLVANIA (contd.)

Northampton County (contd.)
Carnotite Occurrences
Easton
Chestnut Hill
Williams (formerly Sherrer) quarry along Delaware River on SE slope of Chestnut Hill near Easton: autunite, carnotite, gummite, thorianite, uranophane in quarry of Precambrian Franklin limestone altered by pegmatite intrusion: 669; autunite, carnotite(?), thorianite, thorogummite, and uranophane; analysis of sample of Precambrian Franklin limestone gave 0.058% eU; 0.009% U, 0.30% Th, and 3.9 x 10-11 g. Ra/g.: 973; autunite, carnotite, thoriumgummite, uranophane in pegmatite intruded into impure Franklin dolomitic limestone: 873; autunite, thorianite thought by Gehman to be pitchblende or uraninite when he discovered it there but later identified as thorianite when U.S.G.S. analyses showed its high Th content, gummite, carnotite, uranophane; analysis of thorianite, average of two samples, gave 4.44% UO_2, 33.15% UO_3, 38.47% ThO_2, 2.49% rare earths, 31.50% U, and 33.81% Th; analysis for gummite gave 42.70% U_3O_8, 25.06% ThO_2, 5.10% rare earths, 36.21% U and 22.03% Th; age determination by Pb, U, Th method gave Precambrian: 865; carnotite, and other radioactive minerals: 1098; thorianite, thought by Gehman to be pitchblende or uraninite when he discovered it there

PENNSYLVANIA (contd.)

Northampton County (contd.)
Carnotite Occurrences
Easton
Chestnut Hill
Williams (formerly Sherrer) quarry: but identified here as thorianite by U.S.G.S. analyses; analysis of thorianite, average of two samples, gave 4.44% UO_2, 33.15% UO_3, 2.49% rare earths, 31.50% U, and 33.81% Th; analysis for one alteration product, clarkeite or gummite or thorium gummite, gave 42.70% U_3O_8, 25.06% ThO_2, 5.10% rare earths, 36.21% U, and 22.03% Th; age determination by Pb, U, Th method gave Precambrian; fracture planes in serpentine also coated with autunite, carnotite: 1012/1013; uranium minerals present including thorianite, thorogummite, uranophane, autunite, and a carnotite-like mineral, in serpentine in a very narrow zone: 759.

Gummite Occurrences
Easton
Chestnut Hill
Williams (formerly Sherrer) quarry along Delaware River on SE slope of Chestnut Hill near Easton: autunite, carnotite, gummite, thorianite, uranophane in quarry of Precambrian Franklin limestone altered by pegmatite intrusion: 669; autunite, thorianite, thought by Gehman to be pitchblende or uraninite when he discovered it there but later identified as thorianite when U.S.G.S. analyses showed its high Th content, gummite, carnotite, uranophane; analysis of thorianite, average of two samples, gave 4.44% UO_2, 33.15% UO_3, 38.47% ThO_2, 2.49% rare earths, 31.50% U, and

PENNSYLVANIA (contd.)

Northampton County (contd.)
Gummite Occurrences
Easton
Chestnut Hill
Williams (formerly Sherrer) quarry: 33.81% Th; analysis for gummite gave 42.70% U_3O_8, 25.06% ThO_2, 5.10% rare earths, 36.21% U, and 22.03% Th; age determination by Pb, U, Th method gave Precambrian: 865; thorianite, thought by Gehman to be pitchblende or uraninite when he discovered it there but identified here as thorianite by U.S.G.S. analyses; analysis of thorianite, average of two samples, gave 4.44% UO_2, 33.15% UO_3, 2.49% rare earths, 31.50% U, and 33.81% Th; analysis for one alteration product, clarkeite or gummite or thorium gummite, gave 42.70% U_3O_8, 25.06% ThO_2, 5.10% rare earths, 36.21% U, and 22.03% Th; age determination by Pb, U, Th method gave Precambrian; fracture planes in serpentine also coated with autunite, carnotite: 1012; 1013.
Verdolite quarry on Chestnut Hill near Easton: uranophane, uranium thorianite, gummite (thorium-bearing): 661.
Radioactive Iron Deposits
Morgan Hill mines on N side of Morgan Hill and S side of Easton: no radioactivity reported in limonite-hematite orebody in Kittanning limestone but sample of ore gave 0.005% eU: 843.

PENNSYLVANIA (contd.)

Northampton County (contd.)
Radioactive Rocks
U. S. Highway 611 near Easton about 150 ft. S of Williams quarry: outcrop measurements with a Geiger counter indicate an area 25 by 100 ft. with a content of 0.02-0.05% eU: 973.
Thorianite Occurrences
Easton: two chemical analyses of thorianite gave 31.50 and 31.05% U, 33.87 and 33.75% Th, and ages of 790 and 770 m.y.: 925.
Easton
Bushkill Creek, quarry along: thorianite: 865.
Chestnut Hill, S side of, in excavation for a reservoir: thorianite: 865
Chestnut Hill
Williams (formerly Sherrer) quarry along Delaware River on SE slope of Chestnut Hill near Easton: autunite, carnotite, gummite, thorianite, uranophane in quarry of Precambrian Franklin limestone altered by pegmatite intrusion: 669; autunite, carnotite(?), thorianite, thorogummite, and uranophane; analysis of sample of Precambrian Franklin limestone gave 0.058% eU, 0.009% U, 0.30% Th, and 3.9 x 10^{-11} g. Ra/g.: 973; pegmatites intrude limestone and contain autunite, thorianite, thorogummite, uranophane: 861; autunite, thorianite thought by Gehman to be pitchblende or uraninite when he discovered it there but later identified as thorianite when U.S.G.S. analyses showed its high Th content, gummite, carnotite, uranophane; analysis of thorianite, average of two samples, gave 4.44% UO_2, 33.15% UO_3, 38.47% ThO_2, 2.49% rare earths, 31.50% U, and

PENNSYLVANIA (contd.)

Northampton County (contd.)
Thorianite Occurrences
Easton
Chestnut Hill
Williams (formerly Sherrer) quarry:
33.81% Th; analysis for gummite gave 42.70% U_3O_8, 25.06% ThO_2, 5.10% rare earths, 36.21% U, and 22.03% Th; age determination by Pb, U, Th method gave Precambrian: 865; thorianite, thought by Gehman to be pitchblende or uraninite when he discovered it there but identified here as thorianite by U.S.G.S. analyses; analysis of thorianite, average of two samples, gave 4.44% UO_2, 33.15% UO_3, 2.49% rare earths, 31.50% U, and 33.81% Th; analysis for one alteration product, clarkeite or ~~gummite or~~ thorium gummite, gave 42.70% U_3O_8, 25.06% ThO_2, 5.10% rare earths, 36.21% U, and 22.03% Th; age determination by Pb, U, Th method gave Precambrian; fracture planes in serpentine also coated with autunite, carnotite:1012, 1013; uranium minerals present including thorianite, thorogummite, uranophane, autunite, and a carnotite-like mineral, in serpentine in a very narrow zone: 759; uranotil as tiny, needle-like, brilliant yellow crystals in a fissure in tremolite; autunite, thorianite, and other unnamed minerals: 983.
Verdolite quarry on Chestnut Hill near Easton: uranophane, uranium thorianite, gummite (thorium-bearing): 661.

PENNSYLVANIA (contd.)

Northampton County (contd.)
Thorite Occurrences
Easton
Chestnut Hill
Williams (formerly Sherrer) quarry along Delaware River on SE slope of Chestnut Hill near Easton: pegmatite cutting across S part is radioactive and contains thorite intimately associated with specular hematite, and thin coatings of autunite(?) were found at NW corner of quarry on slickenside surfaces and joints in serpentine; the thorium and uranium minerals for which the locality is well known came from the north face of the quarry from a zone 18 in. wide dipping steeply to S parallel to foliation of serpentine but accessible part has been removed by quarrying; part of it may still crop out but would be about 75 ft. up quarry face; another zone along W face of quarry is radioactive and rich in phlogopite but no radioactive minerals have been separated from this material: 843.
Thorium Occurrences
Bethlehem: allanite: 82, 950, 1098; allanite first reported from here in 1855 by Genth, who published an analysis; later found in several localities in vicinity of Bethlehem and Redington: 863, 865; zircons imbedded in allanite: 964.
*General: allanite reported in many gneisses in South Mountain in Northampton County and probably is also present, though not reported, in Lehigh County: 863.

PENNSYLVANIA (contd.)

Northampton County (contd.)
Thorium Occurrences
Bethlehem
Lehigh Mountain near Bethlehem in Lower Saucon Township: allanite: 975; allanite in a mass weighing 100 lbs.; not uncommon mineral in gneiss of this area: 766; radioactive minerals present and, when given, intensity of radiograph on photographic plate: allanite: 1018.
South Mountain in Lower Saucon Township near Bethlehem: allanite in syenitic gneiss: 927; allanite at several locations in gneiss: 863, 865; black masses of allanite with yellowish brown crust due to decomposition; imperfect crystals: 766
South Mountain in Lower Saucon Township W of Easton: radioactive minerals present and, when given, intensity of radiograph on photographic plate: allanite: 1018
South Mountain in Lower Saucon Township near Bethlehem: radioactive minerals present and, when given, intensity of radiograph on photographic plate: allanite: 1018.
South Mountains in Lower Saucon Township at two locations, 5 mi. E of and 3/4 mi. N of Bethlehem: allanite in narrow veins or seams in granitic rock: 762
Easton: two chemical analyses of thorianite gave 31.50 and 31.05% U, 33.87 and 33.75% Th, and ages of 790 and 770 m.y.: 925.

PENNSYLVANIA (contd.)

Northampton County (contd.)
Thorium Occurrences
Easton
Bushkill Creek, quarry along: thorianite: 865
Chestnut Hill, S side of in excavation for a reservoir: thorianite: 865.
Chestnut Hill, at SW end in roadcut on Pennsylvania Highway 115, 1 mi. N of junction with U. S. Highway 611: radioactivity of soil-covered portion of cut estimated at 0.015% eU; analysis of two samples of Precambrian Pickering gneiss gave respectively 0.006 and 0.012% eU and 0.004 and 0.008% U: 973.
Chestnut Hill
Williams (formerly Sherrer) quarry along Delaware River on SE slope of Chestnut Hill near Easton: autunite, carnotite, gummite, thorianite, uranophane in quarry of Precambrian Franklin limestone altered by pegmatite intrusion: 669; autunite, carnotite(?), thorianite, thorogummite, and uranophane; analysis of sample of Precambrian Franklin limestone gave 0.058% eU, 0.009% U, 0.30% Th, and 3.9 x 10-11 g. Ra/g.: 973; autunite, carnotite, thorium-gummite, uranophane in pegmatite intruded into impure Franklin dolomitic limestone: 873; autunite, thorianite thought by Gehman to be pitchblende or uraninite when he discovered it there but later identified as thorianite when U.S.G.S. analyses showed its high thorium content, gummite, carnotite, uranophane; analysis of thorianite, average of two samples, gave 4.44% UO_2, 33.15% UO_3, 38.47% ThO_2, 2.49% rare earths, 31.50% U, and 33.81% Th; analysis for gummite gave 42.70% U_3O_8, 25.06% ThO_2,

PENNSYLVANIA (contd.)

Northampton County (contd.)
Thorium Occurrences
Easton
Chestnut Hill
Williams (formerly Sherrer) quarry:
5.10% rare earths, 36.21% U, and 22.03% Th; age determination by Pb, U, Th method gave Precambrian: 865; pegmatite cutting across S part is radioactive and contains thorite intimately associated with specular hematite, and thin coatings of autunite(?) were found at NW corner of quarry on slickenside surfaces and joints in serpentine; the thorium and uranium minerals for which the locality is well known came from the north face of the quarry from a zone 18 in. wide dipping steeply to S parallel to foliation of serpentine but accessible part has been removed by quarrying; part of it may still crop out but would be about 75 ft. up quarry face; another zone along W face of quarry is radioactive and rich in phlogopite but no radioactive minerals have been separated from this material: 843; pegmatites intrude limestone and contain autunite, thorianite, thorogummite, uranophane: 861; thorianite, thought by Gehman to be pitchblende or uraninite when he discovered it there but identified here as thorianite by U.S.G.S. analyses; analysis of thorianite, average of two samples, gave 4.44% UO_2, 33.15% UO_3, 2.49% rare earths, 31.50% U, and 33.81% Th; analysis for one alteration product, clarkeite or gummite or thorium gummite, gave 42.70% U_3O_8, 25.06% ThO_2, 5.10%

PENNSYLVANIA (contd.)

Northampton County (contd.)
Thorium Occurrences
Easton
Chestnut Hill
Williams (formerly Sherrer) quarry:
rare earths, 36.21% U, and 22.03% Th; age determination by Pb, U, Th method gave Precambrian; fracture planes in serpentine also coated with autunite, carnotite: 1012, 1013; uranium minerals present including thorianite, thorogummite, uranophane, autunite, and a carnotite-like mineral, in serpentine in a very narrow zone: 759; uranotil as tiny, needle-like, brilliant yellow crystals in a fissure in tremolite; autunite, thorianite, and other unnamed radioactive minerals: 983.
Verdolite quarry on Chestnut Hill near Easton: uranophane, uranium thorianite, gummite (thorium-bearing): 661.
Redington: allanite: 975; allanite found in several localities in the vicinity of both Bethlehem and Redington: 863, 865.
Weber's quarry in Lower Saucon 6 mi. from Easton: allanite in crystalline gneisses: 863.
Thorogummite Occurrences
Easton
Chestnut Hill
Williams (formerly Sherrer) quarry along Delaware River on SE slope of Chestnut Hill near Easton: autunite, carnotite(?), thorianite, thorogummite, and uranophane, analysis of sample of Precambrian Franklin limestone gave 0.058% eU; 0.009% U, 0.30% Th, and 3.9 x 10-11 g. Ra/g.: 973; autunite, carnotite, thorium-gummite, uranophane in pegmatite intruded into impure Franklin dolomitic

PENNSYLVANIA (contd.)

Northampton County (contd.)
Thorogummite Occurrences
Easton
Chestnut Hill
Williams (formerly Sherrer) quarry:
limestone: 873; pegmatites intrude limestone and contain autunite, thorianite, thorogummite, uranophane: 861; uranium minerals present including thorianite, thorogummite, uranophane, autunite, and a carnotite-like mineral, in serpentine in a very narrow zone: 759.
Uranium Occurrences
Easton: two chemical analyses of thorianite gave 31.50 and 31.05% U, 33.87 and 33.75% Th, and ages of 790 and 770 m.y.: 925.
Easton
Bushkill Creek, quarry along:
thorianite: 865.
Chestnut Hill, S side of, in excavation for a reservoir:
thorianite: 865.
Chestnut Hill, at SW end in roadcut on Pennsylvania Highway 115, 1 mi. N of junction with U. S. Highway 611: radioactivity of soil-covered portion of cut estimated at 0.015% eU; analysis of two samples of Precambrian Pickering gneiss gave respectively 0.006 and 0.012% eU and 0.004 and 0.008% U: 973.
Chestnut Hill
General: radioactivity anomalies distributed discontinuously along the top from 1½ mi. SW of Delaware River NE to Williams quarry on SE flank of mountain just N of Easton; most of the areas included in the anomalies, except at Williams quarry, do not have outcrops and show less intensity than those on Marble Mountain in New Jersey; the

PENNSYLVANIA (contd.)

Northampton County (contd.)
Uranium Occurrences
Easton
Chestnut Hill
General:
anomalies occur in Pickering gneiss near its contact with Franklin limestone and in some places pegmatite has been injected into this contact, as shown in a roadcut along Pennsylvania Highway 15; no outcrops occur in other anomalies: 843.
Origin: mineralogy and close spatial relationship of radioactive rocks in both the Chestnut Hill and Marble Mountain occurrences suggest that pegmatite is the source of the radioactive elements, which may have been deposited from solution after migration along contact between Franklin limestone and Pickering gneiss or through other sheared and faulted zones in the Precambrian rocks, but structure and probably lithology are the controlling features of their concentration since the anomalies occur along the strike of these features for a distance of more than two miles: 843.
Williams (formerly Sherrer) quarry along Delaware River on SE slope of Chestnut Hill near Easton: autunite, carnotite, gummite, thorianite, uranophane, in quarry of Precambrian Franklin limestone altered by pegmatite intrusion: 669; autunite, carnotite(?), thorianite, thorogummite, and uranophane; analysis of sample of Precambrian Franklin limestone gave 0.058% eU, 0.009% U, 0.30% Th, and 3.9 x 10^{-11} g. Ra/g.: 973; autunite,

PENNSYLVANIA (contd.)

Northampton County (contd.)
Uranium Occurrences
Easton
Chestnut Hill
Williams (formerly Sherrer)
quarry:
carnotite, thorium-gummite, uranophane in pegmatite intruded into impure Franklin dolomitic limestone: 873; autunite, thorianite thought by Gehman to be pitchblende or uraninite with he discovered it there but later identified as thorianite when U.S.G.S. analyses showed its high Th content, gummite carnotite, uranophane; analysis of thorianite, average of two samples, gave 4.44% UO_2, 33.15% UO_3, 38.47% ThO_2, 2.49% rare earths, 31.50% U, and 33.81% Th; analysis for gummite gave 42.70% U_3O_8, 25.06% ThO_2, 5.10% rare earths, 36.21% U, and 22.03% Th; age determination by Pb, U, Th method gave Precambrian: 865; carnotite, and other radioactive minerals: 1098; pegmatite cutting across S part is radioactive and contains thorite intimately associated with specular hematite, and thin coatings of autunite(?) were found at NW corner of quarry on slickenside surfaces and joints in serpentine; the thorium and uranium minerals for which the locality is well known came from the north face of the quarry from a zone 18 in. wide dipping steeply to S parallel to foliation of serpentine but accessible part has been removed by quarrying; part of it may still crop out but would be about 75 ft. up quarry face; another zone

PENNSYLVANIA (contd.)

Northampton County (contd.)
Uranium Occurrences
Easton
Chestnut Hill
Williams (formerly Sherrer)
quarry:
along W face of quarry is radioactive and rich in phlogopite but no radioactive minerals have been separated from this material: 843; pegmatites intrude limestone and contain autunite, thorianite, thorogummite, uranophane: 861; thorianite, thought by Gehman to be pitchblende or uraninite when he discovered it there but identified here as thorianite by U.S.G.S. analyses; analysis of thorianite, average of two samples, gave 4.44% UO_2, 33.15% UO_3, 2.49% rare earths, 31.50% U, and 33.81% Th; analysis for one alteration product, clarkeite or gummite or thorium gummite, gave 42.70% U_3O_8, 25.06% ThO_2, 5.10% rare earths, 36.21% U, and 22.05% Th; age determination by Pb, U, Th method gave Precambrian; fracture planes in serpentine also coated with autunite, carnotite: 1012; uranium minerals present including thorianite, thorogummite, uranophane, autunite, and a carnotite-like mineral, in serpentine in a very narrow zone: 759; uranotil as tiny, needle-like, brilliant yellow crystals in a fissure in tremolite; autunite, thorianite, and other unnamed radioactive minerals: 983.
Verdolite quarry on Chestnut Hill near Easton: uranophane, uranium thorianite, gummite (thorium-bearing): 661.

PENNSYLVANIA (contd.)

Northampton County (contd.)
Uranophane Occurrences
Easton
Chestnut Hill
Williams (formerly Sherrer) quarry along Delaware River on SE slope of Chestnut Hill near Easton: autunite, carnotite, gummite, thorianite, uranophane in quarry of Precambrian Franklin limestone altered by pegmatite intrusion: 669; autunite, carnotite(?), thorianite, thorogummite, and uranophane; analysis of sample of Precambrian Franklin limestone gave 0.058% eU, 0.009% U, 0.30% Th, and 3.9×10^{-11} g. Ra/g.: 973; autunite, carnotite, thorium-gummite, uranophane in pegmatite intruded into impure Franklin dolomitic limestone: 873; autunite, thorianite thought by Gehman to be pitchblende or uraninite when he discovered it there but later identified as thorianite when U.S.G.S. analyses showed its high Th content, gummite, carnotite, uranophane, analysis of thorianite, average of two samples, gave 4.44% UO_2, 33.15% UO_3, 38.47% ThO_2, 2.49% rare earths, 31.50% U, and 33.81% Th; analysis for gummite gave 42.70% U_3O_8, 25.06% ThO_2, 5.10% rare earths, 36.21% U, and 22.03% Th; age determination by Pb, U, Th method gave Precambrian: 865; pegmatites intrude limestone and contain autunite, thorianite, thorogummite, uranophane: 861; uranium minerals present including thorianite, thorogummite, uranophane, autunite and a carnotite-like mineral, in

PENNSYLVANIA (contd.)

Northampton County (contd.)
Uranophane Occurrences
Easton
Chestnut Hill
Williams (formerly Sherrer) quarry: serpentine in a very narrow zone: 759.
Verdolite quarry on Chestnut Hill near Easton: uranophane, uranium thorianite, gummite (thorium-bearing): 661.
Uranotil Occurrences
Easton
Chestnut Hill
Williams (formerly Sherrer) quarry along Delaware River on SE slope of Chestnut Hill near Easton: uranotil as tiny, needle-like, brilliant yellow crystals in a fissure in tremolite; autunite, thorianite, and other unnamed radioactive minerals: 983.

Northumberland County
Radioactive Coal
Western Middle Field
Mount Carmel quadrangle
Abandoned strip mine in Lykens Valley No. 2 coal, 2.5 mi. NW of Mount Carmel town limit, 0.4 mi. NE of Pennsylvania Highway 54: radioactivity reported for shale, coal, and sandstone, starting with uppermost: dark-gray, thin bedded shale, 0.001% eU; fine- to medium-grained sandstone and two bright sheared coals, all three less than 0.001% eU; bright sheared coal, 0.001% eU; and dark-gray shale, 0.002% eU: 1011; radioactivity of Lykens No. 2 coal, 0.001% eU: 994.

PENNSYLVANIA (contd.)

Northumberland County (contd.)
Radioactive Coal
Western Middle Field
Mount Carmel quadrangle
Strip mine in Mammoth coal, 0.2 mi. N of Kulpmont town limit, 0.3 mi. W of Marion Heights town limit: radioactivity of coal and shale, starting with uppermost: medium dark-gray, silty shale, 0.001% eU; two bright coals, both less than 0.001% eU; and non-radioactive very carbonaceous shale: 1011.
Shamokin quadrangle
Abandoned strip pit in Mammoth coal, 3.0 mi. NE of center of Shamokin, 0.2 mi. N of railroad: radioactivity reported for shale and coal, starting with uppermost: grayish-black shale, 0.001% eU; two bright coals, both less than 0.001% eU; dark-gray carbonaceous shale, 0.001% eU; bright coal, less than 0.001% eU; non-radioactive very dark-gray shale; moderately bright coal, less than 0.001% eU; non-radioactive dark-gray poorly bedded shale and a bone coal; and two moderately bright coals, both less than 0.001% eU: 1011.

PENNSYLVANIA (contd.)

Northumberland County (contd.)
Radioactive Rocks
Western Middle Field
Mount Carmel quadrangle
Abandoned strip mine in Lykens Valley No. 2 coal, 2.5 mi. NW of Mount Carmel town limit, 0.4 mi. NE of Pennsylvania Highway 54: radioactivity reported for shale, coal, and sandstone, starting with uppermost: dark-gray, thin bedded shale, 0.001% eU; fine- to medium-grained sandstone and two bright sheared coals, all three less than 0.001% eU; bright sheared coal, 0.001% eU, and dark-gray shale, 0.002% eU: 1011.
Strip mine in Mammoth coal, 0.2 mi. N of Kulpmont town limit, 0.3 mi. W of Marion Heights town limit: radioactivity of coal and shale, starting with uppermost: medium dark-gray silty shale, 0.001% eU; two bright coals, both less than 0.001% eU; and non-radioactive very carbonaceous shale: 1011.
Shamokin quadrangle
Abandoned strip pit in Mammoth coal, 3.0 mi. NE of center of Shamokin, 0.2 mi. N of railroad: radioactivity reported for shale and coal, starting with uppermost: grayish-black shale, 0.001% eU; two bright coals, both less than 0.001% eU; dark-gray carbonaceous shale, 0.001% eU; bright coal, less than 0.001% eU; non-radioactive very dark-gray shale; moderately bright coal, less than 0.001% eU; non-radioactive dark-gray poorly bedded shale and a bone coal; and two moderately bright coals, both less than 0.001% eU: 1011.

PENNSYLVANIA (contd.)

Origin of Carnotite Occurrences
See under individual county names and under Index III, Origin-Carnotite Occurrences-Pennsylvania: 1016, 1017.

Origin of Uranium Occurrences
See under individual county names and under Index III, Origin-Uranium Occurrences-Pennsylvania: 733, 843, 867, 1016, 1017.

Perry County
Radioactive Rocks
Harrisburg, 2 mi. N of: radiometric examination in field of Clinton group red sandstones and shales, no radioactivity found; no analysis for U or P_2O_5: 935.
Loysville, 5 mi. SW of: radiometric analysis in laboratory of grab sample of Center iron sandstone, massive red sandstone, no radioactivity found; no analysis for U or P_2O_5: 935.

Philadelphia County
Allanite Occurrences
General: allanite: 635; allanite in unnamed quarries: 975.
Philadelphia
Frankford: allanite: 82, 1098.
Frankford
Hoffman's quarry on E side of Tacony Creek, N of Fisher's Lane in Tacony Creek Valley: allanite in Philadelphia (Frankford) gneiss: 665; allanite in pegmatite: 766; radioactive minerals found and, when given, intensity of radiograph on photographic plate: allanite, crystalline masses, faintly active: 1018.

PENNSYLVANIA (contd.)

Philadelphia County (contd.)
Allanite Occurrences
Philadelphia
Germantown
McCrea's quarry in Mount Airy at Germantown and Mermaid Aves.: allanite, autunite, gummite, torbernite, uranophane in pegmatite: 766.
Mount Airy: radioactive minerals present and, when given, intensity of radiograph on photographic plate: gummite, minute specks, feebly active; autunite, crystalline scales, moderately active; torbernite, crystalline scales, moderately active; allanite, minute grains: 1018.
Rittenhouse Lane: allanite: 766.
Autunite Occurrences
Philadelphia
Broad Street between Logan station and Olney Ave.: autunite, uranophane and cyrtolite in Philadelphia schists and gneisses: 665; autunite, cyrtolite, uranophane, xenotime in Wissahickon gneiss and pegmatite: 766.
Broad Street and Olney Avenue, exposure at SE corner: radioactive minerals present, and, when given, intensity of radiograph on photographic plate: uranochre, thin coating, moderately active; autunite, crystalline scales, moderately active; columbite in small crystals, feebly active and may contain Th; cyrtolite, minute crystals, feebly active: 1018.
Fairmount: autunite, torbernite in gneiss: 762; autunite and torbernite among minerals found: 908.

PENNSYLVANIA (contd.)

Philadelphia County (contd.)
Autunite Occurrences
Philadelphia
Fairmount
Bluffs on W side of Schuylkill River N of Spring Garden Street bridge and opposite old Fairmount waterworks: uraninite, and, as weathering products, autunite, torbernite, gummite, uraconite, all in Wissahickon gneiss and pegmatite: 766.
Excavations and quarries for Pennsylvania Railroad yards W of Fairmount: radioactive minerals present and, when given, intensity of radiograph on photographic plate: torbernite, crystalline scales, moderately active; autunite: 1018.
Fairmount in quarry: gneiss contained autunite as crystals or crystalline coatings, sometimes quite abundant, about six specimens of chalcolite associated with autunite, one specimen of uranochre, and hyalite colored yellow by uranium: 911.
Judge Peters' quarry on site of Lipp's brewery on W side of Schuylkill River opposite Fairmount waterworks: autunite, gummite, torbernite, uraninite, in Philadelphia gneiss: 665; radioactive minerals present and, when given, intensity of radiograph on photographic plate: uraninite; uranochre(?), thin coating, moderately active, autunite, crystalline scales, moderately active; torbernite, crystalline scales, moderately active; uran-hyalite, coating, faintly active: 1018.

PENNSYLVANIA (contd.)

Philadelphia County (contd.)
Autunite Occurrences
Philadelphia
Fairmount Park
Bluffs along West River Drive and Pennsylvania Railroad Bridge above Girard Ave.: autunite in Philadelphia schists and gneisses: 665; autunite in Wissahickon gneiss and pegmatite: 766; radioactive minerals present and, when given, intensity of radiograph on photographic plate: autunite: 1018.
Frankford: randite was name given by Koenig in 1878 to a supposed hydrous carbonate of calcium and uranium found as canary-yellow coatings on granite pegmatite and hornblende gneiss: 757; original mineral was found in Frankford (Barber's) quarry but similar yellow coatings have been found on Wissahickon gneiss at several nearby quarries associated with autunite, torbernite, and yellowish-green fluorescent hyalite: 757.
Frankford, N of Adams St. at S end of large quarry: uranium-yellow coating thought to be a mixture of autunite and calcite; later analysis by Dr. Koenig showed it to be a hydrous carbonate of uranium and lime which he names randite; proportion of uranium to lime was 44 to 56 (Koenig), 62 to 38 (Rand) and 74 to 26 (Rand); 46.71% U_2O_3 was found from precipitates; further investigation needed: 909.

PENNSYLVANIA (contd.)

Philadelphia County (contd.)
Autunite Occurrences
Philadelphia
Germantown
McCrea's quarry in Mount Airy at Germantown and Mermaid Aves.: autunite, torbernite, uranophane in Manayunk schists: 665; allanite, autunite, gummite, torbernite, uranophane in pegmatite: 766.
Mount Airy: radioactive minerals present and, when given, intensity of radiograph on photographic plate: gummite, minute specks, feebly active; autunite, crystalline scales, moderately active; torbernite, crystalline scales, moderately active; allanite, minute grains: 1018.
West Philadelphia: autunite on gneiss: 761.
Beta-Uranotile Occurrences
Philadelphia
Frankford: recent optical and X-ray study of the original specimens of randite showed the crusts were gross mixtures of calcite, kaolin, beta-uranotile, and tyuyamunite, so that the name seems to have been applied to a mixture of known species and is to be discredited: 757.
Chalcolite Occurrences
Philadelphia
Fairmount in quarry: gneiss contained autunite as crystals or crystalline coatings, sometimes quite abundant, about six specimens of chalcolite associated with autunite, one specimen of uranochre, and hyalite colored yellow by uranium: 911.

PENNSYLVANIA (contd.)

Philadelphia County (contd.)
Cyrtolite Occurrences
Philadelphia
Broad Street between Logan station and Olney Avenue: autunite, uranophane and cyrtolite in Philadelphia schists and gneisses: 665; autunite, cyrtolite, uranophane, xenotime in Wissahickon gneiss and pegmatite: 766.
Broad Street and Olney Avenue, exposure at SE corner: radioactive minerals present and, when given, intensity of radiograph on photographic plate: uranochre, thin coating, moderately active; autunite, crystalline scales, moderately active; columbite in small crystals, feebly active and may contain Th; cyrtolite, minute crystals, feebly active: 1018.
Germantown
Comly's quarry SE of Mermaid station in Mount Airy: cyrtolite, torbernite in pegmatite: 766; torbernite, cyrtolite: 665; radioactive minerals present and, when given, intensity of radiograph on photographic plate: torbernite; cyrtolite(?), rough crystals, moderately active: 1018.
Gadolinite Occurrences
Philadelphia
Wissahickon Valley in Rittenhouse quarry: gadolinite(?): 766.

PENNSYLVANIA (contd.)

Philadelphia County (contd.)
Gummite Occurrences
Philadelphia
Fairmount
Bluffs on W side of Schuylkill River N of Spring Garden Street bridge and opposite old Fairmount waterworks: uraninite, and, as weathering products, autunite, torbernite, gummite, uraconite, all in Wissahickon gneiss and pegmatite: 766.
Judge Peters' quarry on site of Lipp's brewery on W side of Schuylkill River opposite Fairmount waterworks: autunite gummite, torbernite, uraninite in Philadelphia gneiss: 665.
Fairmount Park: uraninite, gummite: 862.
Germantown
McCrea's quarry in Mount Airy at Germantown and Mermaid Aves.: allanite, autunite, gummite, torbernite, uranophane in pegmatite: 766.
Mount Airy: uraninite, gummite: 862; radioactive minerals present and, when given, intensity of radiograph on photographic plate: gummite, minute specks, feebly active; autunite, crystalline scales, moderately active; torbernite, crystalline scales, moderately active; allanite, minute grains: 1018.
Hyalite, Uranium-bearing
Philadelphia
Fairmount
Fairmount in quarry: gneiss contained autunite as crystals or crystalline coatings sometimes quite abundant, about six specimens of chalcolite associated with autunite, one specimen of uranochre, and hyalite colored yellow by uranium: 911.

PENNSYLVANIA (contd.)

Philadelphia County (contd.)
Hyalite, Uranium-bearing
Philadelphia
Fairmount
Judge Peters' quarry on site of Lipp's brewery on W side of Schuylkill River opposite Fairmount waterworks: radioactive minerals present and, when given, intensity of radiograph on photographic plate: uraninite, uranochre(?), thin coating, moderately active; autunite, crystalline scales, moderately active; torbernite, crystalline scales, moderately active; uranhyalite, coating, faintly active: 1018.
Frankford
Frankford (Barber's) quarry at Leiper and Church Sts. on E side of Frankford Creek: radioactive minerals present and, when given, intensity of radiograph on photographic plate: randite, coating, moderately active; uranhyalite, coating, faintly active: 1018.
Small quarry NE of Frankford Creek on Church St. opposite large quarry: hyalite containing uranium: 911.
Radioactive Columbite
Philadelphia
Broad Street and Olney Avenue, exposure at SE corner: radioactive minerals present and, when given, intensity of radiograph on photographic plate: uranochre, thin coating, moderately active; autunite, crystalline scales, moderately active; columbite in small crystals, feebly active and may contain Th; cyrtolite, minute crystals, feebly active: 1018.

PENNSYLVANIA (contd.)

Philadelphia County (contd.)
Radioactive Springs
Philadelphia
Fairmount Park: radioactivity determinations on 12 springs gave values for radon content ranging from 2 x 10^{-10} curies/liter of water to 35 x 10^{-10} curies/liter of water; the more radioactive springs issued from the early Cambrian formation and the less radioactive springs issued from the Precambrian Wissahickon gneiss: 677.
Radioactive Titanite
Philadelphia
Canal Road, quarry at end of, on Schuylkill River: radioactive minerals present and, when given, intensity of radiograph on photographic plate: titanite, crystals, faintly active: 1018.
Randite Occurrences
Philadelphia: granite coated with canary- to lemon-yellow substance, which chemical analysis showed to be a mixture of uranium and lime carbonates; related in composition to voglite and liebigite but has much less water; given the name randite but needs more examination to prove it is a new species: 818
Philadelphia
Frankford: randite was name given by Koenig in 1878 to a supposed hydrous carbonate of calcium and uranium found as canary-yellow coatings on granite pegmatite and hornblende gneiss: 757; randite, early chemical analysis by Rand gave high calcite content and 46.71% U_2O_3 and 16.71% CaO after calcite had been dissolved away: 757; original mineral was found in

PENNSYLVANIA (contd.)

Philadelphia County (contd.)
Randite Occurrences
Philadelphia
Frankford:
Frankford (Barber's) quarry but similar yellow coatings have been found on Wissahickon gneiss at several nearby quarries associated with autunite, torbernite, and yellowish-green fluorescent hyalite: 757; recent optical and X-ray study of the original specimens of randite showed the crusts were gross mixtures of calcite, kaolin, beta-uranotile, and tyuyamunite, so that the name seems to have been applied to a mixture of known species and is to be discredited: 757; hyalite colored by uranium, randite in gneiss: 908.
Frankford, N of Adams St. at S end of large quarry: uranium-yellow coating thought to be a mixture of autunite and calcite; later analysis by Dr. Koenig showed it to be a hydrous carbonate of uranium and lime which he named randite; proportion of uranium to lime was 44 to 56 (Koenig), 62 to 38 (Rand), and 74 to 26 (Rand); 46.71% U_2O_3 was found from precipitate; further investigation needed: 909.
Frankford
Frankford (Barber's) quarry at Leiper and Church Sts. on E side of Frankford Creek: randite: 766; randite in Philadelphia (Frankford) schists: 665; radioactive minerals present and, when given, intensity of radiograph on photographic plate: randite, coating, moderately active; uran-hyalite, coating, faintly active: 1018.

PENNSYLVANIA (contd.)

Philadelphia County (contd.)
Randite Occurrences
Philadelphia
Frankford
Horrocks' quarry at Unity and Wingohocking Streets: randite: 766; randite in Philadelphia (Frankford) gneiss: 665.
Large quarry NE of Frankford Creek: randite in orthoclase bed in gneiss: 911.
Thorium Occurrences
General: allanite: 635; allanite in unnamed quarries: 975
Philadelphia
Broad Street between Logan station and Olney Avenue: autunite, uranophane and cyrtolite in Philadelphia schists and gneisses: 665; autunite, cyrtolite, uranophane, xenotime in Wissahickon gneiss and pegmatite: 766.
Broad Street and Olney Avenue, exposure at SE corner: radioactive minerals present and, when given, intensity of radiograph on photographic plate: uranochre, thin coating, moderately active; autunite, crystalline scales, moderately active; columbite in small crystals, feebly active and may contain Th; cyrtolite, minute crystals, feebly active: 1018.
Fairmount
Bluffs on W side of Schuylkill River N of Spring Garden Street bridge and opposite old Fairmount waterworks: uraninite, and, as weathering products, autunite, torbernite, gummite, uraconite, all in Wissahickon gneiss and pegmatite: 766.

PENNSYLVANIA (contd.)

Philadelphia County (contd.)
Thorium Occurrences
Philadelphia
Fairmount
Judge Peters' quarry on site of Lipp's brewery on W side of Schuylkill River opposite Fairmount waterworks: gummite, autunite, torbernite, uraninite, in Philadelphia gneiss: 665; radioactive minerals present and, when given, intensity of radiograph on photographic plate: uraninite; uranochre(?), thin coating, moderately active; autunite, crystalline scales, moderately active; torbernite, crystalline scales, moderately active; uranhyalite, coating, faintly active: 1018.
Fairmount Park: uraninite; gummite: 862; uraninite and secondary uranium alteration minerals: 1098.
Frankford: allanite: 82, 1098.
Frankford
Hoffman's quarry on E side of Tacony Creek, N of Fisher's Lane, in Tacony Creek Valley: allanite in Philadelphia (Frankford) gneiss: 665; allanite in pegmatite: 766; radioactive minerals present and, when given, intensity of radiograph on photographic plate: allanite, crystalline masses, faintly active: 1018.
Germantown
Comly's quarry SE of Mermaid station in Mount Airy: torbernite, cyrtolite: 665; cyrtolite, torbernite in pegmatite: 766; radioactive minerals present and, when given, intensity of radiograph on photographic plate: torbernite; cyrtolite(?), rough crystals, moderately active: 1018.

PENNSYLVANIA (contd.)

Philadelphia County (contd.)
Thorium Occurrences
Philadelphia
Germantown
McCrea's quarry in Mount Airy: at Germantown and Mermaid Avenues: allanite, autunite, gummite, torbernite, uranophane in pegmatite: 766.
Mount Airy: uraninite, gummite: 862; radioactive minerals present and, when given, intensity of radiograph on photographic plate: gummite, minute specks, feebly active; autunite, crystalline scales, moderately active; torbernite, crystalline scales, moderately active; allanite, minute grains: 1018.
Rittenhouse Lane: allanite: 766.
Wissahickon Valley in Rittenhouse quarry: gadolinite(?): 766.
Torbernite Occurrences
Philadelphia
Fairmount: autunite, torbernite in gneiss: 762; autunite and torbernite among minerals found: 908.
Fairmount
Bluffs on W side of Schuylkill River N of Spring Garden Street bridge and opposite old Fairmount waterworks: uraninite, and, as weathering products, autunite, torbernite, gummite, uraconite, all in Wissahickon gneiss and pegmatite: 766.
Excavations and quarries for Pennsylvania Railroad yards W of Fairmount: radioactive minerals present and, when given, intensity of radiograph on photographic plate: torbernite, crystalline scales, moderately active; autunite: 1018.

PENNSYLVANIA (contd.)

Philadelphia County (contd.)
Torbernite Occurrences
Philadelphia
Fairmount
Judge Peter's quarry on site of Lipp's brewery on W side of Schuylkill River opposite Fairmount waterworks: autunite, gummite, torbernite, uraninite in Philadelphia gneiss: 665; radioactive minerals present and, when given, intensity of radiograph on photographic plate: uraninite; uranochre(?), thin coating, moderately active; autunite, crystalline scales, moderately active; torbernite, crystalline scales, moderately active; uran-hyalite, coating, faintly active: 1018.
Frankford: randite was name given by Koenig in 1878 to a supposed hydrous carbonate of calcium and uranium found as canary-yellow coating on granite pegmatite and hornblende gneiss: 757; original mineral was found in Frankford (Barber's) quarry but similar yellow coatings have been found on Wissahickon gneiss at several nearby quarries associated with autunite, torbernite, and yellowish-green fluorescent hyalite: 757.
Frankford
Wingohocking station, quarries E of: torbernite in Wissahickon gneiss and pegmatite: 766; radioactive minerals present and, when given, intensity of radiograph on photographic plate: torbernite: 1018.

PENNSYLVANIA (contd.)

Philadelphia County (contd.)
Torbernite Occurrences
Philadelphia
Germantown
Abandoned quarry on N side of P. & R. Railroad E of Penn St.: torbernite in Philadelphia schists: 665.
Comly's quarry SE of Mermaid station in Mount Airy: torbernite, cyrtolite: 665; cyrtolite and torbernite in pegmatite: 766; radioactive minerals present and, when given, intensity of radiograph on photographic plate: torbernite; cyrtolite(?), rough crystals, moderately active: 1018.
McCrea's quarry in Mount Airy at Germantown and Mermaid Aves.: autunite, torbernite, uranophane in Manayunk schists: 665; allanite, autunite, gummite, torbernite, uranophane in pegmatite: 766.
Mount Airy: radioactive minerals present and, when given, intensity of radiograph on photographic plate: gummite, minute specks, feebly active; autunite, crystalline scales, moderately active; torbernite, crystalline scales, moderately active; allanite, minute grains: 1018.
Penn Street quarry or Mill Street quarry, Bellfield and Penn Streets: torbernite in Philadelphia schists in old quarry and street grading: 665; torbernite in pegmatite: 766.

PENNSYLVANIA (contd.)

Philadelphia County (contd.)
Tyuyamunite Occurrences
Philadelphia
Frankford: recent optical and X-ray study of the original specimens of randite showed the crusts were gross mixtures of calcite, kaolin, beta-uranotile, and tyuyamunite, so that the name seems to have been applied to a mixture of known species and is to be discredited: 757.
Uraconite Occurrences
Philadelphia
Fairmount
Bluffs on W side of Schuylkill River N of Spring Garden Street bridge and opposite old Fairmount waterworks: uraninite, and, as weathering products, autunite, torbernite, gummite, uraconite, all in Wissahickon gneiss and pegmatite: 766.
Fairmount Park: uraconite; C. Frondel considers uraconite "essentially a name without a mineral" stating that most specimens labelled uraconite in museum collections turn out to be zippeite or uranopilite: 758.
Uran-Hyalite Occurrences
Philadelphia
Fairmount
Fairmount in quarry: gneiss contained autunite as crystals or crystalline coatings, sometimes quite abundant, about six specimens of chalcolite associated with autunite, one specimen of uranochre, and hyalite colored yellow by uranium: 911.

PENNSYLVANIA (contd.)

Philadelphia County (contd.)
Uran-Hyalite Occurrences
Philadelphia
Fairmount
Judge Peters' quarry on site of Lipp's brewery on W side of Schuylkill River opposite Fairmount waterworks: radioactive minerals present and, when given, intensity of radiograph on photographic plate: uraninite; uranochre(?) thin coating, moderately active; autunite, crystalline scales, moderately active; torbernite, crystalline scales, moderately active; uran-hyalite, coating, faintly active: 1018.
Frankford
Frankford (Barber's) quarry at Leiper and Church Streets on E side of Frankford Creek: radioactive minerals present and, when given, intensity of radiograph on photographic plate: randite, coating, moderately active; uran-hyalite, coating, faintly active: 1018.
Small quarry NE of Frankford Creek on Church Street opposite large quarry: hyalite containing uranium: 911.
Uraninite Occurrences
Philadelphia
Fairmount
Bluffs on W side of Schuylkill River N of Spring Garden Street bridge and opposite old Fairmount waterworks: uraninite, and, as weathering products, autunite, torbernite, gummite, uraconite, all in Wissahickon gneiss and pegmatite: 766.

PENNSYLVANIA (contd.)

Philadelphia County (contd.)
Uraninite Occurrences
Philadelphia
Fairmount
Judge Peters' quarry on site of Lipp's brewery on W side side of Schuylkill River opposite Fairmount waterworks: autunite, gummite, torbernite, uraninite in Philadelphia gneiss: 665; radioactive minerals present and, when given, intensity of radiograph on photographic plate: uraninite; uranochre (?), thin coating, moderately active; autunite, crystalline scales, moderately active; torbernite, crystalline scales, moderately active; uran-hyalite, coating, faintly active: 1018.
Fairmount Park: uraninite, gummite: 862; uraninite and secondary uranium alteration minerals: 1098.
Germantown
Mount Airy: uraninite, gummite: 862.
Uranite Occurrences
Philadelphia
Fairmount
Judge Peters' quarry on site of Lipp's brewery on W side of Schuylkill River opposite Fairmount waterworks: lime and copper uranite: 907;
Schuylkill River, along bank from Gray's Ferry to Girard Avenue bridge: gneiss with uranite, copper uranite; rocks similar to those near Chester in Delaware County: 910.
Suspension Bridge, area $\frac{1}{4}$ mi. from: uranite: 927.
*Quarry S of site of Lipp's brewery: lime and copper uranite: 907.

PENNSYLVANIA (contd.)

Philadelphia County (contd.)
Uranium Occurrences
Philadelphia: granite coated with canary- to lemon-yellow substance, which chemical analysis showed to be a mixture of uranium and lime carbonates; related in composition to voglite and liebigite but has much less water; given the name randite but needs more examination to prove it is a new species: 818.
Philadelphia
Broad Street between Logan station and Olney Avenue: autunite, uranophane and cyrtolite in Philadelphia schists and gneisses: 665; autunite, cyrtolite, uranophane, xenotime in Wissahickon gneiss and pegmatite: 766.
Broad Street and Olney Avenue, exposure at SE corner: radioactive minerals present and, when given, intensity of radiograph on photographic plate: uranochre, thin coating, moderately active; autunite, crystalline scales, moderately active; columbite, in small crystals, feebly active and may contain Th; cyrtolite, minute crystals, feebly active: 1018.
Fairmount: autunite, torbernite in gneiss: 762; autunite and torbernite among minerals found: 908.
Fairmount
Bluffs on W side of Schuylkill River N of Spring Garden Street bridge and opposite old Fairmount waterworks: uraninite, and, as weathering products, autunite, torbernite, gummite, uraconite, all in Wissahickon gneiss and pegmatite: 766.

PENNSYLVANIA (contd.)

Philadelphia County (contd.)
Uranium Occurrences
Philadelphia
Fairmount
Excavations and quarries for Pennsylvania Railroad yards W of Fairmount: radioactive minerals present and, when given, intensity of radiograph on photographic plate: torbernite, crystalline scales, moderately active; autunite: 1018.
Fairmount in quarry: gneiss contained autunite as crystals or crystalline coatings, sometimes quite abundant, about six specimens of chalcolite associated with autunite, one specimen of uranochre, and hyalite colored yellow by uranium: 911.
Judge Peters' quarry on site of Lipp's brewery on W side of Schuylkill River opposite Fairmount waterworks: autunite, gummite, torbernite, uraninite in Philadelphia gneiss: 665; lime and copper uranite: 907; radioactive minerals present and, when given, intensity of radiograph on photographic plate: uraninite; uranochre(?), thin coating, moderately active; autunite, crystalline scales, moderately active; torbernite, crystalline scales, moderately active; uran-hyalite, coating, faintly active: 1018.
Quarry S of site of Lipp's brewery: lime and copper uranite: 907.

PENNSYLVANIA (contd.)

Philadelphia County (contd.)
Uranium Occurrences
Philadelphia
Fairmount Park: uraninite, gummite: 862; uraninite and secondary uranium alteration minerals: 1098; uraconite; C. Frondel considers uraconite as "essentially a name without a mineral" stating that most specimens labelled uraconite in museum collections turn out to be zippeite or uranopilite: 758.
Bluffs along West River Drive and Pennsylvania Railroad bridge above Girard Avenue: autunite in Wissahickon gneiss and pegmatite: 766; autunite in Philadelphia schists and gneisses: 665; radioactive minerals present, and when given, intensity of radiograph on photographic plate: autunite: 1018.
Frankford: randite was name given by Koenig in 1878 to a supposed hydrous carbonate of calcium and uranium found as canary-yellow coatings on granite pegmatite and hornblende gneiss: 757; randite, early chemical analysis Rand give high calcite content and 46.71% "U_2O_3" and 16.71% CaO after calcite had been dissolved away: 757; original mineral was found in Frankford (Barber's) quarry but similar yellow coatings have been found on Wissahickon gneiss at several nearby quarries associated with autunite, torbernite, and yellowish-green fluorescent hyalite: 757; recent optical and X-ray study of the original specimens

PENNSYLVANIA (contd.)

Philadelphia County (contd.)
Uranium Occurrences
Philadelphia
Frankford:
of randite showed the crusts were gross mixtures of calcite, kaolin, beta-uranotile, and tyuyamunite, so that the name seems to have been applied to a mixture of known species and is to be discredited: 757; hyalite colored by uranium, randite in gneiss: 908.
Frankford, N of Adams Street at S end of large quarry: uranium-yellow coating thought to be a mixture of autunite and calcite; later analysis by Dr. Koenig showed it to be a hydrous carbonate of uranium and lime which he named randite; proportion of uranium to lime was 44 to 56 (Koenig), 62 to 38 (Rand), and 74 to 26 (Rand); 46.71% U_2O_3 was found from precipitate; further investigation needed: 909.
Frankford (Barber's) quarry at Leiper and Church Streets on E side of Frankford Creek: randite: 766; randite in Philadelphia (Frankford) schists: 665; radioactive minerals present and, when given, intensity of radiograph on photographic plate: randite, coating, moderately active; uran-hyalite, coating faintly active: 1018.
Horrock's quarry at Unity and Wingohocking Streets: randite: 766; randite in Philadelphia (Frankford) gneiss: 665.
Large quarry NE of Frankford Creek: randite in orthoclase bed in gneiss: 911.
Small quarry NE of Frankford Creek on Church Street opposite large quarry: hyalite containing uranium: 911.

PENNSYLVANIA (contd.)

Philadelphia County (contd.)
Uranium Occurrences
Philadelphia
Frankford
Wingohocking station, quarries E of: torbernite in Wissahickon gneiss and pegmatite: 766; radioactive minerals present and, when given, intensity of radiograph on photographic plate: torbernite: 1018.
Germantown
Abandoned quarry on N side of P. & R. Railroad E of Penn Street: torbernite in Philadelphia schists: 665.
Comly's quarry SE of Mermaid station in Mount Airy: torbernite, cyrtolite: 665; cyrtolite, torbernite in pegmatite: 766; radioactive minerals present, and, when given, intensity of radiograph on photographic plate: torbernite, cyrtolite(?), rough crystals, moderately active: 1018.
McCrea's quarry in Mount Airy at Germantown and Mermaid Avenues: autunite, torbernite, uranophane in Manayunk schists: 665; autunite, allanite, gummite, torbernite, uranophane in pegmatite: 766.
Mount Airy: uraninite, gummite: 862; radioactive minerals present and, when given, intensity of radiograph on photographic plate: gummite, minute specks, feebly active; autunite, crystalline scales, moderately active; torbernite, crystalline scales, moderately active; allanite, minute grains: 1018.
Penn Street quarry or Mill Street quarry, Bellfield and Penn Streets: torbernite in Philadelphia schists in old quarry and street grading: 665; torbernite in pegmatite: 766.

PENNSYLVANIA (contd.)

Philadelphia County (contd.)
Uranium Occurrences
Hyalite, Uranium-bearing
Philadelphia
Fairmount
Fairmount in quarry: gneiss contained autunite as crystals or crystalline coatings, sometimes quite abundant, about six specimens of chalcolite associated with autunite, one specimen of uranochre, and hyalite colored yellow by uranium: 911.
Judge Peters' quarry on site of Lipp's brewery on W side of Schuylkill River opposite Fairmount waterworks: radioactive minerals present and, when given, intensity of radiograph on photographic plate: uraninite; uranochre (?), thin coating, moderately active; autunite, crystalline scales, moderately active; torbernite, crystalline scales, moderately active; uran-hyalite, coating, faintly active: 1018.
Frankford
Frankford (Barber's) quarry at Leiper and Church Streets on E side of Frankford Creek: radioactive minerals present and, when given, intensity of radiograph on photographic plate: randite, coating, moderately active; uran-hyalite, coating, faintly active: 1018.
Small quarry NE of Frankford Creek on Church Street opposite large quarry: hyalite containing uranium: 911.

PENNSYLVANIA (contd.)

Philadelphia County (contd.)
Uranium Occurrences
Philadelphia
Schuylkill River, along bank from Gray's Ferry to Girard Avenue bridge: gneiss with uranite, copper uranite; rocks similar to those near Chester in Delaware County: 910.
Suspension Bridge, area ¼ mi. from: uranite: 927.
West Philadelphia: autunite on gneiss: 761.
Uranochre Occurrences
Philadelphia
Broad Street and Olney Avenue, exposure at SE corner: radioactive minerals present and, when given, intensity of radiograph on photographic plate: uranochre, thin coating, moderately active; autunite, crystalline scales, moderately active; columbite in small crystals, feebly active and may contain Th; cyrtolite, minute crystals, feebly active: 1018.
Fairmount
Fairmount in quarry: gneiss contained autunite as crystals or crystalline coatings; sometimes quite abundant, about six specimens of chalcolite associated with autunite, one specimen of uranochre, and hyalite colored yellow by uranium: 911.
Judge Peters' quarry on site of Lipp's brewery on W side of Schuylkill River opposite Fairmount waterworks: radioactive minerals present and, when given, intensity of radiograph on photographic plate: uraninite; uranochre(?), thin coating, moderately active; autunite, crystalline scales,

PENNSYLVANIA (contd.)

Philadelphia County (contd.)
Uranochre Occurrences
Philadelphia
Fairmount
Judge Peters' quarry: moderately active; torbernite, crystalline scales; moderately active; uran-hyalite, coating, faintly active: 1018.
Uranophane Occurrences
Philadelphia
Broad Street between Logan station and Olney Avenue: autunite, uranophane and cyrtolite in Philadelphia schists and gneisses: 665; autunite, cyrtolite, uranophane, xenotime in Wissahickon gneiss and pegmatite: 766.
Germantown
McCrea's quarry in Mount Airy at Germantown and Mermaid Avenues: autunite, torbernite, uranophane in Manayunk schists: 665; allanite, autunite, gummite, torbernite, uranophane in pegmatite: 766.
Xenotime Occurrences
Philadelphia
Broad Street between Logan station and Olney Avenue: autunite, cyrtolite, uranophane, xenotime in Wissahickon gneiss and pegmatite: 766.

Pitchblende Occurrences
See under individual county names and under Index III, Pitchblende Occurrences-Pennsylvania: 765, 907, 908, 1084.

Prospectors' Guides
See under individual county names and under Index III, Prospectors' Guides-Pennsylvania: 1101.

PENNSYLVANIA (contd.)

Radioactive Carbonaceous Deposits
See under individual county names and under Index III, Radioactive Carbonaceous Deposits-Pennsylvania: 1005.

Radioactive Carbonaceous Shale
See under individual county names and under Index III, Radioactive Carbonaceous Shale-Pennsylvania: 1005.

Radioactive Clay
See under individual county names and under Index III, Radioactive Clay-Pennsylvania: 748, 994.

Radioactive Coal
See under individual county names and under Index III, Radioactive Coal-Pennsylvania: 748, 893, 994, 1011.

Radioactive Columbite
See under individual county names and under Index III, Radioactive Columbite-Pennsylvania: 1018.

PENNSYLVANIA (contd.)

Radioactive Iron Deposits
See under individual county names and under Index III, Radioactive Iron Deposits-Pennsylvania: 843, 1089.

Radioactive Magnetite
See under individual county names and under Index III, Radioactive Magnetite-Pennsylvania: 786, 843.

Radioactive Minerals
See under individual county names and under Index III, Radioactive Minerals-Pennsylvania: 1018.

Radioactive Rocks
See under individual county names and under Index III, Radioactive Rocks-Pennsylvania: 216, 724, 748, 825, 826, 935, 973, 994, 1011.

Radioactive Springs
See under individual county names and under Index III, Radioactive Springs-Pennsylvania: 677.

Radioactive Titanite
See under individual county names and under Index III, Radioactive Titanite-Pennsylvania: 1018.

Radioactive Water
See under individual county names and under Index III, Radioactive Water-Pennsylvania: 816, 971.

Radioactivity Determinations
See under individual county names and under Index III, Radioactivity Determinations-Pennsylvania: 935.

Randite Occurrences
See under individual county names and under Index III, Randite Occurrences-Pennsylvania: 665, 757, 818, 908, 909, 911, 1018.

PENNSYLVANIA (contd.)

Samarskite Occurrences
See under individual county names and under Index III, Samarskite Occurrences-Pennsylvania: 665, 975, 1018.

Sandstone, Uranium-bearing
See under individual county names and under Index III, Sandstone, Uranium-bearing-Pennsylvania: 995, 996.

Schroeckingerite Occurrences
See under individual county names and under Index III, Schroeckingerite Occurrences-Pennsylvania: 867, 1078, 1087.

Schuylkill County
Radioactive Coal
Abandoned mine opening 0.2 mi. S of Delano: radioactivity of Buck Mountain coal, 0.001% eU: 994.
Eastern Middle Field
Conyngham quadrangle
Abandoned strip pit in Buck Mountain coal, 1.1 mi. N of Pennsylvania Highway 924: radioactivity reported for shale and coal, starting with uppermost: a dark-gray shale and a shale with bony coal, both 0.002% eU; a bright coal and a moderately bright coal, separated by an unsampled bone coal taken together, less than 0.001% eU; non-radioactive bone coal; a very bright coal separated from a bright coal by unsampled bone coal and shale, taken together, less than 0.001% eU; non-radioactive bone coal; and bright coal, less than 0.001% eU: 1011.
Roadcut 1.0 mi. NE of Frackville and 0.1 mi. SE of Pennsylvania Highway 924: radioactivity of two samples of No. 6 coal, both 0.001% eU: 994.

PENNSYLVANIA (contd.)

Roadcuts on U.S. Highway 122 at Pottsville: radioactivity of coals, shales, sandstones, and siltstone in the Pottsville formation and the adjacent layers of the Allegheny and Mauch Chunk formations, studied in this area, gave following results, starting with uppermost layer within each formation: Allegheny formation: shale, 0.001% eU; Mammoth coal bloom, less than 0.001% eU; shale and siltstone, 0.001% or less eU; coal, less than 0.001% eU; sandstone, shale and thin coals, 0.001% or less eU; sheared Buck Mountain coal, less than 0.001% eU; carbonaceous shale, 0.001% eU and non-radioactive coal: 1011; Pottsville formation: black shale, from 0.001-0.002% eU; conglomeratic sandstone, less than 0.001% eU; carbonaceous shale, 0.002% eU; sheared coal and dark-gray shale, both 0.001% eU; carbonaceous shale, 0.002% eU; sheared coal and dark-gray shale, both 0.001% eU; conglomeratic sandstone with a few carbonaceous shale lenses, less than 0.001% eU; carbonaceous shale, 0.001% eU; sandstone, less than 0.001% eU; carbonaceous shale, 0.001% eU; conglomeratic sandstone with few carbonaceous shale lenses, less than 0.001% eU; non-radioactive carbonaceous shale; bony coal, less than 0.001% eU; carbonaceous shale, 0.001% eU; non-radioactive carbonaceous shale and bony coal; coarse-grained sandstone, 0.001% eU; bony coal, less than 0.001% eU; sandstone with few carbonaceous shale lenses, less than 0.001% eU; non-radioactive bony coal; a medium-grained and a conglomeratic sandstone, separated by non-radioactive layers of coals and carbonaceous shales, both less than 0.001% eU; two layers of carbonaceous shale and siltstone, both ranging from 0.001-0.002% eU, each underlain by a conglomeratic sandstone with less than 0.001% eU;

PENNSYLVANIA (contd.)

Schuylkill County (contd.)
Radioactive Coal
Roadcuts on U.S. Highway 122 at Pottsville: radioactivity of coals, shales, sandstones, and siltstone in the Pottsville formation and the adjacent layers of the Allegheny and Mauch Chunk formations, studied in this area, gave following results, starting with uppermost layer within each formation: carbonaceous shale, ranging from 0.001-0.002% eU; conglomeratic sandstone, less than 0.001% eU; green and red siltstone and shale, interbedded with conglomeratic sandstone, 0.001% or less eU: 1011.
Southern Field
Delano quadrangle
Abandoned mine opening in strip pit in unidentified coal, 0.3 mi. NE of center of Tuscarora, 0.1 mi. W of U.S. Highway 209: radioactivity reported for sandstone, shale, and coal, starting with uppermost: fine-grained sandstone, 0.001% eU; grayish-black shale, 0.001% eU; non-radioactive bright coal and very dark-gray shale; bright coal separated by non-radioactive bone coal from two bright sheared coals, all three less than 0.001% eU; and bone coal, 0.001% eU: 1011.
Strip mine in Primrose coal, 1.2 mi. NE of center of Tuscarora, 0.3 mi. N.W. of U.S. Highway 209: radioactivity reported for shale and coal, starting with uppermost: dark-gray, thin-bedded shale, 0.001% eU; bone coal and carbonaceous shale, 0.001% eU; a medium bright coal, a bone coal with carbonaceous shale, and a mainly bright coal, all three less than 0.001% eU; non-radioactive bone coal; bright coal separated by unsampled bone coal from a bright, sheared coal, taken together, less than 0.001% eU; and bone coal, 0.001% eU: 1011.

PENNSYLVANIA (contd.)

Schuylkill County (contd.)
Radioactive Coal
Southern Field
Pine Grove quadrangle
Abandoned entry in unnamed coal, 2.9 mi. NW of Pine Grove town line on W side of Lorberry Creek gap in Sharp Mountain: radioactivity of coal and shale, starting with uppermost: mottled light and dark shale, 0.001% eU; two bright coals, both less than 0.001% eU; and medium dark-brown siltstone, 0.001% eU: 1011.
Abandoned strip pit in Mammoth coal, 3.6 mi. N of Pine Grove town limit, 0.1 mi. E of Pa. Highway 125: radioactivity reported in coal and shale, starting with the uppermost: medium light-gray shale, 0.001% eU; bright weathered coal, less than 0.001% eU; bright weathered coal, less than 0.001% eU; five bright coals, all less than 0.001% eU; weathered bone coal, less than 0.001% eU; and medium dark-gray shale, 0.001% eU: 1011.
Abandoned strip pit in the Orchard coal, 0.9 mi. SE of Joliett , 0.1 mi. E of all-weather road: radioactivity of coal, shale, clay, and siltstone, starting with uppermost: thin-bedded, grayish-black shale, 0.002% eU; moderately bright sheared coal, less than 0.001% eU; bone and bony coal, less than 0.001% eU; bright sheared coal, less than 0.001% eU; bone and bony coal, less than 0.001% eU; bright sheared coal, less than 0.001% eU; bone coal, 0.001% eU; concealed layer; stigmarian underclay, 0.001% eU; non-radioactive

PENNSYLVANIA (contd.)

Schuylkill County (contd.)
Radioactive Coal
Southern Field
Pine Grove quadrangle
Abandoned strip pit in the Orchard coal, 0.9 mi. SE of Joliette, 0.1 mi. E of all-weather road: laminated coal and shale; three bright sheared coals, all less than 0.001% eU; and stigmarian siltstone, 0.001% eU: 1011.
Pottsville quadrangle
Roadcut exposing Skidmore and Buck Mountain coals on SE town limit of Pottsville: radioactivity of a dark-gray carbonaceous shale, 0.001% eU and of two underlying bright sheared coals, both less than 0.001% eU; nonradioactive interbedded layers of claystones,-sandstone,-siltstone, and coals; sandstone, conglomeratic in lower half, less than 0.001% eU; four weathered coals, all less than 0.001% eU; carbonaceous shale, 0.001% eU; weathered coal, less than 0.001% eU; and dark-gray carbonaceous shale, 0.001% eU: 1011.
Roadcut exposing unidentified coal, 0.3 mi. N of Pottsville town limit on U.S. Highway 122: radioactivity reported for coal, shale, underclay, and siltstone, starting with uppermost: poorly bedded shale, 0.001% eU; thin-bedded carbonaceous shale, 0.002% eU; non-bedded underclay, 0.001% eU; moderately dull impure coal, a mainly bright, impure coal, and two bright coals, all less than 0.001% eU; and massive siltstone, 0.001% eU: 1011.
Roadcut exposing unidentified coal, 0.4 mi. N of center of Pottsville E side of U.S. Highway 122: radioactivity reported for coal, shale, claystone, and siltstone, starting with uppermost: dark gray shale, 0.001% eU; non-bedded claystone, 0.001% eU; three bright coals, all less than 0.001% eU; and stigmarian siltstone, less than 0.001% eU: 1011.

PENNSYLVANIA (contd.)

Schuylkill County (contd.)
Radioactive Coal
Southern Field
Pottsville quadrangle
Roadcut exposing unidentified coal, 0.5 mi. N of Pottsville town limit on U.S. Highway 122: radioactivity reported in shale, coal, and claystone, starting with uppermost: dark-gray carbonaceous shale, 0.001% eU; bright coal, less than 0.001% eU; non-radioactive carbonaceous shale; bright coal, less than 0.001% eU; and poorly bedded claystone, 0.001% eU: 1011.
Roadcut exposing unidentified coal, 0.8 mi. N of Pottsville town limit on U.S. Highway 122: radioactivity reported for shale and coal, starting with uppermost: dark-gray, thin-bedded shale, 0.001% eU; two bright coals separated by unsampled dark-gray shale, less than 0.001% eU; bone coal and underlying bright coal, both less than 0.001% eU; and dark-gray shale, 0.001% eU: 1011.
Tower City quadrangle
Abandoned mine opening in Lykens Valley No. 5 coal, 0.6 mi. N of Tower City: radioactivity of a bright coal and two underlying sheared coals, all less than 0.001% eU: 1011.
Abandoned strip pit in Skidmore coal about 2 mi. N of Tower City, 0.3 mi. SW of Rausch Creek gap of Bear Mountain: radioactivity reported for coal, clay, and shale, starting with uppermost: massive flint fireclay, 0.001% eU; dark-gray, carbonaceous shale, 0.001%

PENNSYLVANIA (contd.)

Schuylkill County (contd.)
Radioactive Coal
Southern Field
Tower City quadrangle
Abandoned strip pit in Skidmore coal about 2 mi. N of Tower City, 0.3 mi. SW of Rausch Creek gap of Bear Mountain: eU; bright coal with thin bony partings, less than 0.001% eU; stigmarian underclay, 0.001% eU and bright coal, less than 0.001% eU: 1011.

Small entry in No. 9½(?) coal, 2 mi. N of Tower City, 0.3 mi. SW of Rausch Creek gap of Bear Mountain: radioactivity reported for coal and shale starting with uppermost: weathered coal, less than 0.001% eU; dark-gray, very carbonaceous shale, 0.002% eU; bright coal, less than 0.001% eU; and medium light-gray, carbonaceous shale, 0.003% eU: 1011.

Small mine in Buck Mountain coal, 1.4 mi. NW of center of Tower City, 0.2 mi. S of crest of Big Lick Mountain: radioactivity reported for coal and shale, starting with uppermost: thin-bedded, carbonaceous shale, 0.002% eU; bright coal with fusain stringers, less than 0.001% eU; and bright coal overlying bone coal overlying moderately dull coal, all taken together, less than 0.001% eU: 1011.

Small mine in Lykens Valley No. 4 coal, 0.7 mi. N of Tower City: radioactivity of two bright sheared coals, both less than 0.001% eU: 1011.

Western Middle Field
Delano quadrangle
Abandoned mine opening in Buck Mountain coal, 0.2 mi. S of center of Delano: radioactivity of coal overlain by non-radioactive grayish-black shale, two mainly bright coals, the upper

PENNSYLVANIA (contd.)

Schuylkill County (contd.)
Radioactive Coal
Western Middle Field
Delano quadrangle
Abandoned mine opening in Buck Mountain coal, 0.2 mi. S of center of Delano: showing less than 0.001% eU and the lower, 0.001% eU: 1011.

Shenandoah quadrangle
Mine entry in Orchard coal, 1.7 mi. NE of Frackville town limit, 0.4 mi. S of Pa. Highway 345: radioactivity reported for sandstone, coal and siltstone, starting with uppermost: sandstone, and bright coal, both less than 0.001% eU; bone and bony coal, 0.001% eU; two bright coals separated from third bright coal by non-radioactive bone coal, all three less than 0.001% eU; non-radioactive stigmarian siltstone: 1011.

Roadcut exposing No. 6 coal, 1.0 mi. N of Frackville town limit, 0.1 mi. SE of Pennsylvania Highway 924: radioactivity reported for sandstone, coal, siltstone, and shale, starting with uppermost; medium to coarse-grained sandstone, less than 0.001% eU; two bright coals, 0.001% eU; non-radioactive very carbonaceous siltstone; medium bright coal, less than 0.001% eU; bone coal, 0.001% eU; and dark-gray shale, 0.002% eU: 1011.

PENNSYLVANIA (contd.)

Schuylkill County (contd.)
Radioactive Coal
Western Middle Field
Shenandoah quadrangle
Small opening in Primrose, Holmes, and No. 9½ coals, 0.8 mi. W of Shenandoah town limit, 0.2 mi. S of Pennsylvania Highway 45: radioactivity reported for shale, coal, underclay, sandstone, and siltstone, starting with uppermost: very dark-gray shale, 0.001% eU; weathered coal and partings, less than 0.001% eU; grayish-black shale, 0.002% eU; two bright coals, both less than 0.001% eU; stigmarian underclay, 0.001% eU; fine-grained sandstone, 0.001% eU; three bright coals, all less than 0.001% eU; grayish-black shale, 0.001% eU; dark gray shale, 0.001% eU; two bright coals, both less than 0.001% eU; and poorly bedded siltstone, less than 0.001% eU: 1011.
Small mine openings in Tracy and Little Diamond coals, 1.4 mi. NE of Frackville town limit, 0.3 mi. SE of Pennsylvania Highway 345: radioactivity of coal and shale, starting with uppermost: thin-bedded carbonaceous shale, 0.001% eU; two bright coals, both less than 0.001% eU; carbonaceous shale separated by concealed layer from silty, pyritic shale, both 0.001% eU; bright sheared coal, less than 0.001% eU; and very carbonaceous shale, 0.001% eU: 1011.
Strip pit in Mammoth coal, 0.6 mi. W of Shenandoah town limit, 0.3 mi. S of Pennsylvania Highway 45: radioactivity reported for siltstone, shale, coal, starting with uppermost; dark-gray siltstone, 0.001% eU; non-radioactive laminated coal and shale; two bright coals separated from a third bright coal by bone and bony coal,

PENNSYLVANIA (contd.)

Schuylkill County (contd.)
Radioactive Coal
Western Middle Field
Shenandoah quadrangle
Strip pit in Mammoth coal, 0.6 mi. W of Shenandoah town limit, 0.3 mi. S of Pennsylvania Highway 45: all four less than 0.001% eU; non-radioactive bone and pyrite; bone coal, 0.001% eU; two bright coals separated by non-radioactive bone coal, both less than 0.001% eU; bone and bony coal, 0.001% eU; bright coal, less than 0.001% eU; and bone coal, 0.001% eU: 1011.
Radioactive Rocks
Eastern Middle Field
Conyngham quadrangle
Abandoned strip pit in Buck Mountain coal, 1.1 mi. N of Pennsylvania Highway 924: radioactivity reported for shale and coal, starting with uppermost: a dark-gray shale and a shale with bony coal, both 0.002% eU; a bright coal and a moderately bright coal, separated by an unsampled bone coal, taken together, less than 0.001% eU; non-radioactive bone coal; a very bright coal separated from a bright coal by unsampled bone coal and shale, taken together, less than 0.001% eU; non-radioactive bone coal; and bright coal, less than 0.001% eU: 1011.
Molino: radiometric examination in field of Swatara iron sandstone (?), massive red sandstone, no radioactivity found; no analysis for U or P_2O_5: 935.

PENNSYLVANIA (contd.)

Schuylkill County (contd.)
Radioactive Rocks
Roadcuts on U.S. Highway 122 at Pottsville: radioactivity of coals, shales, sandstones, and siltstone in the Pottsville formation and the adjacent layers of the Allegheny and Mauch Chunk formations studied in this area, gave following results, starting with uppermost layer within each formation: Allegheny formation: shale, 0.001% eU; Mammoth coal bloom, less than 0.001% eU; shale and siltstone, 0.001% or less eU; coal, less than 0.001% eU; sandstone, shale and thin coals, 0.001% or less eU; sheared Buck Mountain coal, less than 0.001% eU; carbonaceous shale, 0.001% eU; and non-radioactive coal: 1011; Mauch Chunk formation: interbedded siltstone, shale, and sandstone, mainly red with a few green beds, 0.001% or less eU: 1011; Pottsville formation: black shale, from 0.001-0.002% eU; conglomeratic sandstone, less than 0.001% eU; carbonaceous shale, 0.002% eU; sheared coal and dark-gray shale, both 0.001% eU; conglomeratic sandstone with a few carbonaceous shale lenses, less than 0.001% eU; carbonaceous shale, 0.001% eU; sandstone, less than 0.001% eU; carbonaceous shale, 0.001% eU; conglomeratic sandstone with few carbonaceous shale lenses, less than 0.001% eU; non-radioactive carbonaceous shale; bony coal, less than 0.001% eU; carbonaceous shale, 0.001% eU; coal, less than 0.001% eU; non-radioactive carbonaceous shale and bony coal; coarse-grained sandstone, 0.001% eU; bony coal, less than 0.001% eU; sandstone with few carbonaceous shale lenses, less than

PENNSYLVANIA (contd.)

Schuylkill County (contd.)
Radioactive Rocks
Roadcuts on U.S. Highway 122 at Pottsville:
0.001% eU; non-radioactive bony coal; a medium-grained and a conglomeratic sandstone, separated by non-radioactive layers of coals and carbonaceous shales, both less than

PENNSYLVANIA (contd.)

Schuylkill County (contd.)
Radioactive Rocks
Roadcuts on U.S. Highway 122 at Pottsville:
0.001% eU; two layers of carbonaceous shale and siltstone, both ranging from 0.001-0.002% eU, each underlain by a conglomeratic sandstone with less than 0.001% eU; carbonaceous shale, ranging from 0.001-0.002% eU; conglomeratic sandstone, less than 0.001% eU; green and red siltstone and shale, interbedded with conglomeratic sandstone, 0.001% or less eU: 1011.
Southern Field
Delano quadrangle
Abandoned mine opening in strip pit in unidentified coal, 0.3 mi. NE of center of Tuscarora, 0.1 mi. W of U.S. Highway 209: radioactivity reported for sandstone, shale, and coal, starting with uppermost: fine-grained sandstone, 0.001% eU; grayish-black shale, 0.001% eU; non-radioactive bright coal and very dark-gray shale; bright coal separated by non-radioactive bone coal from two bright sheared coals, all three less than 0.001% eU; and bone coal, 0.001% eU: 1011.
Strip mine in Primrose coal, 1.2 mi. NE of center of Tuscarora, 0.3 mi. NW of U.S. Highway 209: radioactivity reported for shale and coal, starting with uppermost: dark-gray, thin bedded shale, 0.001% eU; bone coal and carbonaceous shale, 0.001% eU; a medium bright coal, a bone coal with carbonaceous shale, and a mainly bright coal, all three less than 0.001% eU; non-radioactive bone coal; bright coal separated by unsampled bone coal from a bright, sheared coal, taken together, less than 0.001% eU; and bone coal, 0.001% eU: 1011.

PENNSYLVANIA (contd.)

Schuylkill County (contd.)
Radioactive Rocks
Southern Field
Pine Grove quadrangle
Abandoned entry in unnamed coal, 2.9 mi. NW of Pine Grove town line on W side of Lorberry Creek gap in Sharp Mountain: radioactivity of coal and shale, starting with uppermost: mottled light and dark shale, 0.001% eU; two bright coals, both less than 0.001% eU; and medium dark-brown siltstone, 0.001% eU: 1011.
Abandoned strip pit in Mammoth coal, 3.6 mi. N of Pine Grove town limit, 0.1 mi. E of Pa. Highway 125: radioactivity reported in coal and shale, starting with the uppermost: medium light-gray shale, 0.001% eU; bright weathered coal, less than 0.001% eU; five bright coals, all less than 0.001% eU; weathered bone coal, less than 0.001% eU; and medium dark-gray shale, 0.001% eU: 1011.
Abandoned strip pit in the Orchard coal, 0.9 mi. SE of Joliett, 0.1 mi. E of all-weather road: radioactivity of coal, shale, clay, and siltstone, starting with uppermost: thin-bedded, grayish-black shale, 0.002% eU; moderately bright sheared coal, less than 0.001% eU; bone and bony coal, less than 0.001% eU; bright sheared coal, less than 0.001% eU; bone coal, 0.001% eU; concealed layer; stigmarian underclay, 0.001% eU;

PENNSYLVANIA (contd.)

Schuylkill County (contd.)
Radioactive Rocks
Southern Field
Pine Grove quadrangle
Abandoned strip pit in the Orchard coal, 0.9 mi. SE of Joliett, 0.1 mi. E of all-weather road: non-radioactive laminated coal and shale; three bright sheared coals, all less than 0.001% eU; and stigmarian siltstone, 0.001% eU: 1011.
Pottsville quadrangle
Roadcut exposing unidentified coal, 0.5 mi. N of Pottsville town limit on U.S. Highway 122: radioactivity reported in shale, coal, and claystone, starting with uppermost: dark-gray carbonaceous shale, 0.001% eU; bright coal, less than 0.001% eU; non-radioactive carbonaceous shale; bright coal, less than 0.001% eU; and poorly bedded claystone, 0.001% eU; 1011.

PENNSYLVANIA (contd.)

Schuylkill County (contd.)
Radioactive Rocks
Southern Field
Pottsville quadrangle
Roadcut exposing unidentified coal, 0.8 mi. N of Pottsville town limit on U.S. Highway 122: radioactivity reported for shale and coal, starting with uppermost: dark-gray, thin-bedded shale, 0.001% eU; two bright coals separated by unsampled dark-gray shale, less than 0.001% eU; bone coal and underlying bright coal, both less than 0.001% eU; and dark-gray shale, 0.001% eU: 1011.

PENNSYLVANIA (contd.)

Schuylkill County (contd.)
Radioactive Rocks
Southern Field
Pottsville quadrangle
Roadcut exposing Skidmore and Buck Mountain coals on SE town limit of Pottsville: radioactivity of a dark-gray carbonaceous shale, 0.001% eU and of two underlying bright sheared coals, both less than 0.001% eU; non-radioactive interbedded layers of claystones,-sandstone,-siltstone, and coals; sandstone, conglomeratic in lower half, less than 0.001% eU; four weathered coals, all less than 0.001% eU; carbonaceous shale, 0.001% eU; weathered coal, less than 0.001% eU; and dark-gray carbonaceous shale, 0.001% eU: 1011.
Roadcut exposing unidentified coal, 0.3 mi. N of Pottsville town limit on U.S. Highway 122: radioactivity reported for coal, shale, underclay, and siltstone, starting with uppermost: poorly bedded shale, 0.001% eU; thin-bedded carbonaceous shale, 0.002% eU; non-bedded underclay, 0.001% eU; moderately dull impure coal, a mainly bright, impure coal, and two bright coals, all less than 0.001% eU; and massive siltstone, 0.001% eU: 1011.
Roadcut exposing unidentified coal, 0.4 mi. N of center of Pottsville on E side of U.S. Highway 122: radioactivity reported for coal, shale, claystone, and siltstone, starting with uppermost: dark gray shale, 0.001% eU; non-bedded claystone, 0.001% eU; three bright coals, all less than 0.001% eU;

PENNSYLVANIA (contd.)

Schuylkill County (contd.)
Radioactive Rocks
Southern Field
Pottsville quadrangle
Roadcut exposing unidentified coal, 0.4 mi. N of center of Pottsville on E side of U.S. Highway 122: and stigmarian siltstone, less than 0.001% eU: 1011.
Tower City quadrangle
Abandoned mine in unnamed coal 4 mi. S of Tower City on W side of Mine Run Gap: radioactivity reported in coal and shale, starting with uppermost: dark-gray, carbonaceous shale, 0.002% eU; two bright, sheared coals, both less than 0.001% eU; and dark-gray shale, less than 0.001% eU: 1011.
Abandoned mine opening in Lykens Valley No. 5 coal, 0.6 mi. N of Tower City: radioactivity of a bright coal and two underlying sheared coals, all less than 0.001% eU: 1011.
Abandoned strip pit in Skidmore coal about 2 mi. N of Tower City, 0.3 mi. SW of Rausch Creek gap of Bear Mountain: radioactivity reported for coal, clay and shale, starting with uppermost: massive flint fireclay, 0.001% eU; dark-gray, carbonaceous shale, 0.001% eU; bright coal with thin bony partings, less than 0.001% eU; stigmarian underclay, 0.001% eU; and bright coal, less than 0.001% eU: 1011.

PENNSYLVANIA (contd.)

Schuylkill County (contd.)
Radioactive Rocks
Southern Field
Tower City quadrangle
Small entry in No. 9½(?) coal, 2 mi. N of Tower City, 0.3 mi. SW of Rausch Creek gap of Bear Mountain: radioactivity reported for coal and shale, starting with uppermost: weathered coal, less than 0.001% eU; dark-gray, very carbonaceous shale, 0.002% eU; bright coal, less than 0.001% eU; and medium light-gray, carbonaceous shale, 0.003% eU: 1011.
Small mine in Buck Mountain coal, 1.4 mi. NW of center of Tower City, 0.2 mi. S of crest of Big Lick Mountain: radioactivity reported for coal and shale, starting with uppermost: thin-bedded, carbonaceous shale, 0.002% eU; bright coal with fusain stringers, less than 0.001% eU; and bright coal overlying bone coal overlying moderately dull coal, all taken together, less than 0.001% eU: 1011.
Small mine in Lykens Valley No. 4 coal, 0.7 mi. N of Tower City: radioactivity of two bright, sheared coals, both less than 0.001% eU: 1011.
Small opening in abandoned strip pit in unnamed coal 4 mi. S of Tower City, 0.3 mi. N of Mine Run Gap: radioactivity reported in coal and shale, starting with uppermost; medium, light-gray shale, 0.001% eU; two bright sheared coals, less than 0.001% eU; and dark-gray shale, less than 0.001% eU: 1011.
Western Middle Field
Delano quadrangle
Abandoned mine opening in Buck Mountain coal, 0.2 mi. S of center of Delano: radioactivity of coal overlain by non-radioactive grayish-black shale, two mainly bright coals, the upper showing less than 0.001% eU and the lower, 0.001% eU: 1011.

PENNSYLVANIA (contd.)

Schuylkill County (contd.)
Radioactive Rocks
Western Middle Field
Shenandoah quadrangle
Mine entry in Orchard coal, 1.7 mi. NE of Frackville town limit, 0.4 mi. S of Pa. Highway 345: radioactivity reported for sandstone, coal and siltstone, starting with uppermost: sandstone, and bright coal, both less than 0.001% eU; bone and bony coal, 0.001% eU; two bright coals separated from third bright coal by non-radioactive bone coal, all three less than 0.001% eU; non-radioactive stigmarian siltstone: 1011.
Roadcut exposing No. 6 coal, 1.0 mi. N of Frackville town limit, 0.1 mi. SE of Pa. Highway 924: radioactivity reported for sandstone, coal, siltstone, and shale, starting with uppermost: medium- to coarse-grained sandstone, less than 0.001% eU; two bright coals, 0.001% eU; non-radioactive very carbonaceous siltstone; medium bright coal, less than 0.001% eU; bone coal, 0.001% eU; and dark-gray shale, 0.002% eU: 1011.
Small mine openings in Tracy and Little Diamond coals, 1.4 mi. NE of Frackville town limit, 0.3 mi. SE of Pa. Highway 345: radioactivity of coal and shale, starting with uppermost: thin-bedded carbonaceous shale, 0.001% eU; two bright coals, both less than 0.001% eU; carbonaceous shale separated by concealed layer from silty, pyritic shale, both 0.001% eU; bright sheared coal, less than 0.001% eU; and very carbonaceous shale, 0.001% eU: 1011.

PENNSYLVANIA (contd.)

Schuylkill County (contd.)
Radioactive Rocks
Western Middle Field
Shenandoah quadrangle
Small opening in Primrose, Holmes, and No. 9½ coals, 0.8 mi. W of Shenandoah town limit, 0.2 mi. S of Pennsylvania Highway 45: radioactivity reported for shale, coal, underclay, sandstone, and siltstone, starting with uppermost: very dark-gray shale, 0.001% eU; weathered coal and partings, less than 0.001% eU; grayish-black shale, 0.002% eU; two bright coals, both less than 0.001% eU; stigmarian underclay, 0.001% eU; fine-grained sandstone, 0.001% eU; three bright coals, all less than 0.001% eU; grayish-black shale, 0.001% eU; dark gray shale, 0.001% eU; two bright coals, both less than 0.001% eU; and poorly bedded siltstone, less than 0.001% eU: 1011.
Strip pit in Mammoth coal, 0.6 mi. W of Shenandoah town limit, 0.3 mi. S of Pa. Highway 45: radioactivity reported for siltstone, shale, coal, starting with uppermost: dark-gray siltstone, 0.001% eU; non-radioactive laminated coal and shale; two bright coals separated from a third bright coal by bone and bony coal, all four less than 0.001% eU; non-radioactive bone and pyrite; bone coal, 0.001% eU; two bright coals separated by non-radioactive bone coal, both less than 0.001% eU; bone and bony coal, 0.001% eU; bright coal, less than 0.001% eU; and bone coal, 0.001% eU: 1011.

Snyder County
Radioactive Rocks
Selinsgrove: radiometric examination in field of Clinton group red shales and sandstones, no radioactivity found; no analysis for U or P_2O_5: 935.

PENNSYLVANIA (contd.)

Somerset County
Radioactive Coal
Johnstown quadrangle
Buhl B. Black Construction Co. strip mine on N fork of Bens Creek near Mishler: radioactivity of Upper Freeport coal in two coals separated by non-radioactive bony coal, both less than 0.001% eU: 893.
Somerset quadrangle
Lester J. Lohr strip mine, 15,000 ft. N of center of Boswell and 16,200 ft. N of center of Jennertown: radioactivity of Pittsburgh coal between shale and bony coal, less than 0.001% eU: 893.

Thorium Occurrences
See under individual county names and under Index III, Thorium Occurrences-Pennsylvania: 82, 249, 635, 661, 665, 669, 729, 759, 762, 765, 766, 771, 786, 825, 826, 832, 833, 834, 861, 862, 863, 864, 865, 873, 883, 907, 908, 911, 925, 927, 950, 964, 973, 975, 983, 1012, 1013, 1089, 1098, 1105.

Thorogummite Occurrences
See under individual county names and under Index III, Thorogummite Occurrences-Pennsylvania: 759, 861, 873, 973.

Torbernite Occurrences
See under individual county names and under Index III, Torbernite Occurrences-Pennsylvania: 665, 757, 762, 766, 908, 975, 1005, 1018.

Thorianite Occurrences
See under individual county names and under Index III, Thorianite Occurrences-Pennsylvania: 661, 669, 759, 861, 865, 911, 925, 973, 983, 1012, 1013.

PENNSYLVANIA (contd.)

Tyuyamunite Occurrences
See under individual county names and under Index III, Tyuyamunite Occurrences-Pennsylvania: 733, 757, 817, 867,

Union County
Radioactive Rocks
Allenwood: radiometric analysis of grab sample of Keefer sandstone (Clinton iron ore) with fossils replaced by hematite, no radioactivity found; no analysis for U or P_2O_5: 935.
Lewisburg, 1 mi. S of: radiometric analysis in laboratory of grab sample of Clinton formation oolitic hematite, no radioactivity found; no analysis for U or P_2O_5: 935.
White Deer: radiometric examination in the field of Clinton group and Lower Bloomsburg shales and sandstones, no radioactivity found; no analysis for U or P_2O_5: 935.

Uraconite Occurrences
See under individual county names and under Index III, Uraconite Occurrences-Pennsylvania: 758, 770.

Uran-Hyalite Occurrences
See under individual county names and under Index III, Uran-Hyalite Occurrences-Pennsylvania: 911, 1018.

Uraninite Occurrences
See under individual county names and under Index III, Uraninite Occurrences-Pennsylvania: 665, 733, 762, 862, 863, 864, 911, 975, 1005, 1018, 1098.

Uranite Occurrences
See under individual county names and under Index III, Uranite Occurrences-Pennsylvania: 907, 910, 927.

Uranium Development
See under individual county names and under Index III, Uranium Development-Pennsylvania: 1081.

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Uranium Exploration
See under individual county names and under Index III, Uranium Exploration-Pennsylvania: 765, 817, 1005, 1059, 1075, 1076, 1081, 1086, 1101.

Uranium Occurrences
See under individual county names and under Index III, Uranium Occurrences-Pennsylvania: 7, 20, 46, 78, 82, 426, 444, 509, 635, 661, 665, 669, 733, 748, 757, 758, 759, 761, 762, 765, 766, 770, 817, 818, 834, 841, 861, 862, 863, 864, 865, 867, 873, 874, 883, 893, 907, 908, 909, 910, 911, 917, 925, 927, 973, 975, 983, 995, 996, 1005, 1012, 1013, 1015, 1016, 1017, 1018, 1042, 1054, 1059, 1075, 1076, 1077, 1078, 1081, 1083, 1084, 1085, 1087, 1093, 1098, 1102, 1110.

Bibliography of U.S.G.S. Reports: 572, 1004.

Uranium Ore Guides
See under individual county names and under Index III, Uranium Ore Guides-Pennsylvania: 773.

Uranium Processes
See under individual county names and under Index III, Uranium Processes-Pennsylvania: 513.

Uranium Production
See under individual county names and under Index III, Uranium Production-Pennsylvania: 513, 1005, 1084, 1085.

Uranochre Occurrences
See under individual county names and under Index III, Uranochre Occurrences-Pennsylvania: 762, 907, 908, 911, 1018.

PENNSYLVANIA (contd.)

Uranophane Occurrences
See under individual county names and under Index III, Uranophane Occurrences-Pennsylvania: 661, 665, 669, 759, 817, 861, 865, 867, 873, 973, 975, 995.

Uranothallite Occurrences
See under individual county names and under Index III, Uranothallite Occurrences-Pennsylvania: 1087.

Uranotil Occurrences
See under individual county names and under Index III, Uranotil Occurrences-Pennsylvania: 983.

Washington County
Radioactive Coal
Amity quadrangle
Lindley mine of Pittsburgh Coal Co., 4.9 mi. NE of Washington and ½ mi. E of Carter's Creek: radioactivity of Pittsburgh coal between a pyrite band below and shale interbedded with coal lenses above, less than 0.001% eU: 893.
Bergettstown quadrangle
Greensburg and Connelsville Coal and Coke Co. strip mine, 1½ mi. S of Frankfort: radioactivity of Pittsburgh coal between clay below and shale interbedded with coal lenses above, less than 0.001% eU: 893.
Hofrichter Coal Co. slope mine at Patterson's Mill: radioactivity of Pittsburgh coal between two shales, less than 0.001% eU: 893.
Radioactive Water
Deep well, owned by Peoples Gas Company but not named, located 8 mi. SW of Imperial and 5 mi. NW of McDonald: well called the R. A. Geary or No. 1770 well in I.C. White's general paper about it in 1913; well, dry to 6300 ft., then contains for a 3000-foot depth salt water with a salt content eight times that of seawater; tests by U.S. Bureau of Mines laboratory in Denver on two 5-gallon samples gave a radioactivity of 112.5×10^{-11}g. Ra/liter: 971.

PENNSYLVANIA

Washington County (contd.)
Uranium Processes
Canonsburg: uranium extraction plant: 513.
Uranium Production
Canonsburg: uranium extraction plant: 513.

Westmoreland County
Radioactive Coal
Connellsville quadrangle
J & C Coal Co. drift mine, 1 mi. W of Southwest: radioactivity of Redstone coal, with pyrite stringers between shale and clay, less than 0.001% eU: 893.
John Thomas Coal Co. drift mine, 1 mi. S of Bells Mills: radioactivity of Redstone coal, less than 0.001% eU: 893.
Murphy Coal Co. strip mine, ½ mi. N of Mt. Joy: radioactivity of Redstone coal between gray shale and bony coal, less than 0.001% eU: 893.
New Stanton Coal Co. drift mine, ½ mi. E of New Stanton: radioactivity of Mahoning coal, in three coals separated by shales, all less than 0.001% eU: 893.
Sager Coal Co. drift mine, 1 mi. NE of Smithton: radioactivity of Pittsburgh coal less than 0.001% eU: 893.
Sants Coal Co. strip mine, 1 mi. W of Alverton: radioactivity of Pittsburgh coal between impure coal and shale and a light-gray clay, less than 0.001% eU: 893.
Donegal quadrangle
M. D. Hoyman's strip mine at Rodney: radioactivity of Mercer coal between two shales, less than 0.001% eU: 893.

PENNSYLVANIA (contd.)

Westmoreland County (contd.)
Radioactive Coal
Greensburg quadrangle
Ebancho Brothers Coal Co. strip mine at Bouquet: radioactivity of Pittsburgh coal in three coals, of which upper two are separated by shale and lower two by gray clay, all less than 0.001% eU: 893.
Galetti Coal Co. strip mine at Pleasant Valley: radioactivity of Pittsburgh coal between two gray clays, less than 0.001% eU: 893.
J.E. Santella's Mine Co. drift mine, 5 mi. N of Delmont: radioactivity of Pittsburgh coal between shale and bony coal, less than 0.001% eU: 893.
J.P. Coal Co. drift mine, 2 mi. NE of Jeanette: radioactivity of Mahoning coal in two coals separated by shale and pyrite, both less than 0.001% eU: 893.
T.J. Ward strip mine at Swede Hill: radioactivity of Redstone coal between shale and clay, less than 0.001% eU: 893.
Westmoreland Coal Co. strip mine at Penn Station: radioactivity of Pittsburgh coal in two coals, one having thin pyrite and shale partings, separated by gray clay, both less than 0.001% eU: 893.
Latrobe quadrangle
C.F. Keck's drift mine, 1.7 mi. NW of Latrobe: radioactivity of Bakerstown coal in three coals separated by shale partings, all less than 0.001% eU: 893.
Franks Coal Co. drift mine, 0.3 mi. W of Luxor: radioactivity of Pittsburgh coal between shale and clay, less than 0.001% eU: 893.
Ulishny Fuel Co. drift mine at Beatty: radioactivity of Pittsburgh coal between shale and clay, less than 0.001% eU: 893.

PENNSYLVANIA (contd.)

Westmoreland County (contd.)
Radioactive Coal
Latrobe quadrangle
Wray Coal Co. strip mine, 2 mi. NW of New Alexandria: radioactivity of Pittsburgh coal in two coals separated by light-gray shale, both less 0.001% eU: 893.
New Florence Quadrangle
E.P. Tosh strip mine, 1.5 mi. W of Wilpen: radioactivity of Redstone coal, in three coals separated by shales, all less than 0.001% eU: 893.
Martin & Lewis Mine Co. drift mine, 1 mi. S of Seward: radioactivity of Lower Freeport coal between bony coal and clay, less than 0.001% eU: 893.
Radioactive Water
Ligonier well or People's Natural Gas Co. Well No. 1588, located less than 1 mi. NW of Longbridge: brine tested; "no appreciable quantity" of radium detected by goldleaf electroscope: 816.
Uranium Occurrences
William Penn Highway, hills between Delmont and New Alexandria, 35 mi. from downtown Pittsburgh: uranium ore discovered during grading for highway: 1054.

Xenotime Occurrences
See under individual county names and under Index III, Xenotime Occurrences-Pennsylvania: 825, 826.

Zippeite Occurrences
See under individual county names and under Index III, Zippeite Occurrences-Pennsylvania: 1078.

RHODE ISLAND

General
Monazite Occurrences
General: monazite in granites and gneisses: 104.
Radioactive Occurrences
Bibliography: includes a few papers on radioactive occurrences: 902.
Radioactive Springs
General: description of apparatus and methods used in making radioactivity determinations on water from springs and wells in central part of state around Providence; results tabulated: 896.
Radioactive Waters
General: description of apparatus and methods used in making radioactivity determinations on water from springs and wells in central part of state around Providence; results tabulated: 896.
Thorium Occurrences
General: monazite in granites and gneisses: 104.
Bibliography: includes a few papers on radioactive occurrences: 902.
Uranium Occurrences
Bibliography: includes a few papers on radioactive occurrences: 902.
Bibliography of U.S.G.S. reports: 572, 1004.

Allanite Occurrences
Rhode Island-Allanite Occurrences:
See under individual county names and under Index III, Thorium Occurrences-Rhode Island: 715, 716, 723, 739, 750, 751, 787, 806, 901, 916.

Autunite Occurrences
Rhode Island-Autunite Occurrences:
See under individual county names and under Index III, Autunite Occurrences-Rhode Island: 751.

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Bastnaesite Occurrences
Rhode Island-Bastnaesite Occurrences:
See under individual county names and under Index III, Bastnaesite Occurrences-Rhode Island: 1112.

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Bibliography: includes a few papers on radioactive occurrences: 902.
Thorium Occurrences
Bibliography: includes a few papers on radioactive occurrences: 902.
Uranium Occurrences
Bibliography: includes a few papers on radioactive occurrences: 902.
Bibliography of U.S.G.S. reports: 572, 1004.

Bristol County
Radioactive Waters
Bristol, water from well 60 ft. deep: radioactivity of water 2.78×10^{-10} g. Ra.: 896.

Monazite Occurrences
Rhode Island-Monazite Occurrences:
See under individual county names and under Index III, Thorium Occurrences-Rhode Island: 104, 631, 726, 751, 806, 837, 1112.

Newport County
Monazite Occurrences
Block Island: monazite is present as a detrital species only in the continental shelf sediments off this island and was not reported at five other shore localities from Maine to Maryland: 631.

New Shoreham on S shore: monazite in sands: 751.

RHODE ISLAND (contd.)

Newport County (contd.)
Thorium Occurrences
Block Island: monazite is present as a detrital species only in the continental shelf sediments off this island and was not reported at five other shore localities from Maine to Maryland: 631.
Block Island
New Shoreham on S shore: monazite in sands: 751.

Orthite Occurrences
Rhode Island-Orthite Occurrences: See under individual county names and under Index III, Thorium Occurrences-Rhode Island: 723.

Providence County
Allanite Occurrences
Cumberland: allanite, orthite: 723.
Unnamed location: allanite: 750.
Monazite Occurrences
Unnamed location: monazite: 751.
Orthite Occurrences
Cumberland: allanite, orthite: 723.
Radioactive Graphite
Graphite mine at Arlington: graphite from Fenner's Ledge, from which most highly radioactive springs in Providence area flow, showed only faint traces of radioactive content when powdered and tested qualitatively in alpha-ray electroscope: 896
Radioactive Rocks
Central New England Providence
Clayville, 3 mi. from, along Rhode Island Highways 14 and 102: radioactivity of schist in Sterling granite gneiss which intrudes Bellingham schistose conglomerate here, 0.003% eU: 842.

RHODE ISLAND (contd.)

Providence County (contd.)
Radioactive Springs
Arlington
Spring in graphite mine: spring flowed out of Fenner's Ledge, which contains a mixture of graphite and soft coal: radioactivity of water, 57.93 x 10^{-10} g. Ra.: 896.
Spring near carbarn: spring flowed out of Fenner's Ledge, which contains a mixture of graphite and soft coal; radioactivity of water, 46.71 x 10^{-10} g. Ra.: 896.
Lion farm in East Providence, Spring on: radioactivity of water, 1.18 x 10^{-10} g. Ra.: 896.
Ochee Spring in Johnston: radioactivity of water, 2.20 x 10^{-10} g. Ra.: 896.
Providence
General: description of apparatus and methods used in making radioactivity determinations on water from springs and wells in central part of state around Providence; results tabulated: 896.
Cool Spring in Quinsnicket Park: radioactivity of water, 10.33 x 10^{-10} g. Ra.: 896.
Spring near Girard's Hatchery on Mineral Spring Ave.: radioactivity of water, 11.19 x 10^{-10} g. Ra.: 896.
Spring on Smithfield Ave. near reservoir: radioactivity of water, 2.24 x 10^{-10} g. Ra.: 896.
Spring on Woonsocket carline near Wilbur Ave.: radioactivity of water, 11.70 x 10^{-10} g. Ra.: 896.
Spring water from 150-ft. tank near Girard's Hatchery office: radioactivity of water, 3.86 x 10^{-10} g. Ra.: 896.

RHODE ISLAND (contd.)

Providence County (contd.)
Radioactive Waters
Arlington
Spring near carbarn: spring flowed out of Fenner's Ledge, which contains a mixture of graphite and soft coal; radioactivity of water, 46.71 x 10^{-10} g. Ra.: 896.
Spring in graphite mine: spring flowed out of Fenner's Ledge, which contains a mixture of graphite and soft coal; radioactivity of water, 57.93 x 10^{-10} g. Ra.: 896.
Lion farm in East Providence, spring on: radioactivity of water, 1.18 x 10^{-10} g. Ra.: 896.
Ochee Spring in Johnston: radioactivity of water, 2.20 x 10^{-10} g. Ra.: 896.
Providence
General: description of apparatus and methods used in making radioactivity determinations on water from springs and wells in central part of state around Providence; results tabulated: 896.
College pump well water on Brown University campus: radioactivity of water, 0.73 x 10^{-10} g. Ra.: 896.
Cool Spring in Quinsnicket Park: radioactivity of water, 10.33 x 10^{-10} g. Ra.: 896.
Spring near Girard's Hatchery on Mineral Spring Ave.: radioactivity of water, 11.19 x 10^{-10} g. Ra.: 896.
Spring on Smithfield Ave. near reservoir: radioactivity of water, 2.24 x 10^{-10} g. Ra.: 896.
Spring on Woonsocket carline near Wilbur Ave.: radioactivity of water, 11.70 x 10^{-10} g. Ra.: 896.

RHODE ISLAND (contd.)

Providence County (contd.)
Radioactive Waters
Providence
Spring water from 150-ft. tank near Girard's Hatchery office: radioactivity of water, 3.86 x 10^{-10} g. Ra.: 896.
Tap water in Engineering Laboratory of Brown University: radioactivity of water, which comes from city reservoir, 0.03 x 10^{-10} g. Ra.: 896.
Well water in heating plant on Brown University campus: radioactivity of water, 0.68 x 10^{-10} g. Ra.: 896.
Thorium Occurrences
Cumberland: allanite, orthite: 723.
Unnamed location: allanite: 750; monazite: 751.

Radioactive Graphite
Rhode Island-Radioactive Graphite: See under individual county names and under Index III, Radioactive Graphite-Rhode Island: 896.

Radioactive Occurrences
Rhode Island-Radioactive Occurrences: See under individual county names and under Index III, Radioactive Occurrences-Rhode Island: Bibliography: 902.

Radioactive Rocks
Rhode Island-Radioactive Rocks: See under individual county names and under Index III, Radioactive Rocks-Rhode Island: 842.

Radioactive Springs
Rhode Island-Radioactive Springs: See under individual county names and under Index III, Radioactive Springs-Rhode Island: 896.

RHODE ISLAND (contd.)

Radioactive Waters
See under individual county names and under Index III, Radioactive Waters-Rhode Island: 896.

Thorianite Occurrences
See under individual county names and under Index III, Thorianite Occurrences-Rhode Island: 1112.

Thorium Occurrences
See under individual county names and under Index III, Thorium Occurrences-Rhode Island: 104, 631, 715, 716, 723, 726, 739, 750, 751, 787, 806, 837, 901, 916, 1112.
Bibliography: 902.

Uranium Occurrences
See under individual county names and under Index III, Uranium Occurrences-Rhode Island: 751, 1112.
Bibliography: 902.
Bibliography of U.S.G.S. reports: 572, 1004.

Washington County
Allanite Occurrences
Bradford (formerly Niantic)
Klondike quarry in Charlestown, operated by Gourlay Granite Works about 2 mi. SE of Bradford station and 6 mi. E of Westerly station: allanite as an accessory mineral in the "blue-white Westerly" granite, a medium blueish-gray quartz monzonite granite: 715, 716.
Newall quarry just W of Charlestown line, operated by Joseph Newall & Co.: allanite as an accessory mineral in the "blue-Westerly" granite, a medium blueish-gray quartz monzonite granite: 715, 716.

RHODE ISLAND (contd.)

Washington County (contd.)
Allanite Occurrences
Bradford (formerly Niantic)
Sullivan quarry ½ mi. S of Bradford in Westerly area: allanite in a few scattered crystals as an accessory mineral with heavy minerals concentrated in dark zone at base of granodiorite dike: 901.
Westerly: allanite in granite: 787; allanite, monazite, xenotime as accessory minerals in granite: 806.
Westerly
Catto quarry, operated by Catto Granite Co.: allanite as an accessory mineral in both the "white Westerly statuary" granite, a slightly pinkish medium-gray, fine, even-grained quartz monzonite granite, and the "old blue Westerly" granite, a slightly blueish medium-gray, fine, even-grained granite, like the New England quarry: 715.
Dixon quarry, operated by Sweeney Granite Works, just NE of Westerly station at W foot of E-W ridge N of the railroad; allanite as an accessory mineral in medium buff-gray biotite granite: 715, 716.
Frazer quarry: allanite as an accessory mineral in both the "white Westerly statuary" granite, a slightly pinkish medium-gray, fine, even-grained quartz monzonite granite, and the "old blue Westerly" granite, a slightly blueish medium-gray, fine, even-grained granite, like the New England quarry: 715.
New England quarry, operated by New England Granite Works, just SE of Westerly station: allanite as an accessory mineral in both the "white Westerly statuary" granite, a slightly pinkish medium-gray, fine, even-grained quartz monzonite granite and the "old blue Westerly" granite, a slightly blueish medium-gray, fine, even-grained granite: 715; allanite as

RHODE ISLAND (contd.)

Washington County (contd.)
Allanite Occurrences
Westerly
New England quarry:
an accessory mineral in the "pink Westerly" and "blue Westerly" granites: 716.
North Hill: allanite and xenotime in red Westerly granite: 739.
Smalley quarry N of Westerly: allanite in granite: 751.
Smith quarry, operated by Smith Granite Co., just SE of Westerly station: allanite as an accessory mineral in both the "white Westerly statuary" granite, a slightly pinkish medium-gray, fine, even-grained quartz monzonite granite, and the "old blue Westerly" granite, a slightly blueish medium-gray, fine, even-grained granite, like the New England quarry: 715; allanite as an accessory mineral in the "pink Westerly" and "blue Westerly" granites with some dark-brownish stains from alteration of allanite particles to hematite and limonite: 716; allanite in granite: 751.
Westerly quarries: allanite in Westerly granite: 916.
Autunite Occurrences
Narragansett at Tower Hill: autunite in pegmatite: 751.
Bastnaesite Occurrences
Westerly
Redstone quarry: specimen of Redstone granite, a phase of the Sterling granite gneiss and one of the last differentiates of the Sterling batholith studied; minerals found included bastnaesite, monazite, and uranoan thorianite, while the allanite and xenotime reported

RHODE ISLAND (contd.)

Washington County (contd.)
Bastnaesite Occurrences
Westerly
Redstone quarry:
in earlier literature were not found: 1112; bastnaesite contained 0.39% ThO_2 and 0.0045% U by chemical analysis and occurs in two forms as prismatic crystals and as irregular aggregates: 1112.
Monazite Occurrences
Narragansett Pier: monazite in granite: 726.
Westerly: monazite in granite: 726; allanite, monazite, xenotime as accessory minerals in granite: 806; rare occurrences of tourmaline, molybdenite, and monazite reported in pegmatites in quarries of area: 837.
Westerly
Redstone quarry: specimen of Redstone granite, a phase of the Sterling granite gneiss and one of the last differentiates of the Sterling batholith studied; minerals found included bastnaesite, monazite, and uranoan thorianite, while the allanite and xenotime reported in earlier literature were not found: 1112.
Radioactive Rocks
Central New England Province
Arcadia, 2 mi. NW of, along Rhode Island Highway 165: radioactivity of the aplitic and pegmatitic gneiss in Sterling granite gneiss, 0.003% eU; radiometric and chemical analyses of sample of Sterling granite gneiss on Rhode Island Highway 165, 7.7 mi. E of junction with Connecticut Highway 95, 0.003% eU and 0.001% U: 842.

RHODE ISLAND (contd.)

Washington County (contd.)
Thorianite Occurrences
Westerly
Redstone quarry: specimen of Redstone granite, a phase of the Sterling granite gneiss and one of the last differentiates of the Sterling batholith studied; minerals found included bastnaesite, monazite, and uranoan thorianite, while the allanite and xenotime reported in earlier literature were not found: 1112.

Thorium Occurrences
Bradford (formerly Niantic)
Klondike quarry in Charlestown, operated by Gourlay Granite Works, about 2 mi. SE of Bradford station and 6 mi. E of Westerly station: allanite as an accessory mineral in the "blue-white Westerly" granite, a medium blueish-gray quartz monzonite granite: 715, 716.
Newall quarry just W of Charlestown line, operated by Joseph Newall & Co.: allanite as an accessory mineral in the "blue Westerly" granite, a medium blueish-gray quartz monzonite granite: 715, 716.
Sullivan quarry ½ mi. S of Bradford in Westerly area: allanite in a few scattered crystals as an accessory mineral with heavy minerals concentrated in dark zone at base of granodiorite dike: 901.
Narragansett Pier: monazite in granite: 726.
Westerly: allanite in granite: 787; allanite, monazite, xenotime as accessory minerals in granite: 806; monazite in granite: 726; rare occurrences of tourmaline, molybdenite and monazite reported in pegmatites in quarries of area: 837.

RHODE ISLAND (contd.)

Washington County (contd.)
Thorium Occurrences
Westerly
Catto quarry, operated by Catto Granite Co.: allanite as an accessory mineral in both the "white Westerly statuary" granite, a slightly pinkish medium-gray, fine, even-grained quartz monzonite granite and the "old blue Westerly" granite, a slightly blueish medium-gray, fine, even-grained granite, like the New England quarry: 715.
Dixon quarry, operated by Sweeney Granite Works, just NE of Westerly station at W foot of E-W ridge N of the railroad: allanite as an accessory mineral in medium buff-gray biotite granite: 715, 716.
Frazer quarry: allanite as an accessory mineral in both the "white Westerly statuary" granite, a slightly pinkish medium-gray, fine, even-grained quartz monzonite granite, and the "old blue Westerly" granite, a slightly blueish medium-gray, fine, even-grained granite, like the New England quarry: 715.
New England quarry, operated by New England Granite Works, just SE of Westerly station: allanite as an accessory mineral in both the "white Westerly statuary" granite, a slightly pinkish medium-gray, fine, even-grained quartz monzonite granite and the "old blue Westerly" granite, a slightly blueish medium-gray, fine, even-grained granite: 715; allanite as an accessory mineral in the "pink Westerly" and "blue Westerly" granites: 716.

RHODE ISLAND (contd.)

Washington County (contd.)
Thorium Occurrences
Westerly
North Hill: allanite and xenotime in red Westerly granite: 739.
Redstone quarry: specimen of Redstone granite, a phase of the Sterling granite gneiss and one of the last differentiates of the Sterling batholith studied; minerals found included bastnaesite, monazite, and uranoan thorianite, while the allanite and xenotime reported in earlier literature were not found: 1112; bastnaesite contained 0.39% ThO_2 and 0.0045% U by chemical analysis and occurs in two forms as prismatic crystals and as irregular aggregates: 1112.
Smalley quarry N of Westerly: allanite in granite: 751.
Smith quarry, operated by Smith Granite Co., just SE of Westerly station: allanite as an accessory mineral in both the "white Westerly statuary" granite, a slightly pinkish medium-gray, fine, even-grained quartz monzonite, and the "old blue Westerly" granite, a slightly blueish medium-gray, fine, even-grained granite, like the New England quarry: 715; allanite as an accessory mineral in the "pink Westerly" and "blue Westerly" granites with some dark-brownish stains from alteration of allanite to hematite and limonite: 716; allanite in granite: 751.

RHODE ISLAND (contd.)

Washington County (contd.)
Thorium Occurrences
Westerly
Westerly quarries: allanite in Westerly granite: 916.
Uranium Occurrences
Central New England Province
Arcadia, 2 mi. NW of, along Rhode Island Highway 165: radioactivity of the aplitic and pegmatitic gneiss in Sterling granite gneiss, 0.003% eU; radiometric and chemical analyses of sample of Sterling granite gneiss on Rhode Island Highway 165, 7.7 mi. E of junction with Connecticut Highway 95, 0.003% eU and 0.001% U: 842.
Narragansett at Tower Hill: autunite in pegmatite: 751.
Westerly
Redstone quarry: specimen of Redstone granite, a phase of the Sterling granite gneiss and one of the last differentiates of the Sterling batholith studied; minerals found included bastnaesite, monazite, and uranoan thorianite, while the allanite and xenotime reported in earlier literature were not found: 1112; bastnaesite contained 0.39% ThO_2 and 0.0045% U by chemical analysis and occurs in two forms as prismatic crystals and as irregular aggregates: 1112.
Xenotime Occurrences
Westerly: allanite, monazite, xenotime as accessory minerals in granite: 806.
North Hill: allanite and xenotime in red Westerly granite: 739.

Xenotime Occurrences
See under individual county names and under Index III, Xenotime Occurrences-Rhode Island: 739, 806.

UNITED STATES

General
Age Determinations
Appalachian Region: age determinations using lead-ratio methods on allanite from Virginia, allanite and uraninite from Massachusetts, cyrtolite from New York, monazite, samarskite, and uraninite from Connecticut, monazite and samarskite from Maine, monazite and uraninite from North Carolina, thorianite from Pennsylvania, and uraninite from New Hampshire and South Carolina; other age determinations were made by studies on magnetite and other ore minerals but have not been included here: 925.
Allanite Occurrences
General: allanite deposits are known in Colorado, New Jersey, New York, North Carolina, Pennsylvania, Texas, Virginia, and Wyoming; while most of the deposits are of mineralogical interest only, commercial shipments have been made from Wyoming, Virginia, and possibly North Carolina: 1105.
Bibliographies
Botanical exploration: 571.
Geochemical exploration: 571.
Geophysical exploration (airborne): 571.
Geophysical exploration (ground): 571.
Thorium occurrences: 9; 571.
Uranium exploration: 571; 841.
Uranium exploration
Bibliography of U.S.G.S. reports: 572; 1004.
Uranium occurrences: 9; 10; 571; 841.
Uranium Occurrences
Bibliography of U.S.G.S. reports: 572; 1004.

UNITED STATES (contd.)

General (contd.)
Black Shales, Uranium-bearing
General: characteristics: 405; eastern and central parts: 27.
Antrim shale: carbonaceous shale carrying about 0.01% eU_3O_8: 642; similar to Chattanooga; uranium content increases directly with the percentage of carbon present: 405.
Chattanooga shale: 405; carbonaceous shale carrying about 0.01% eU_3O_8: 642; uranium content of the Chattanooga and related shales appears to decrease from Tennessee north to Michigan as the thickness of the formation increases but Russell believes that the uranium content also increases as the thickness of the formation increases westward: 1103.
Eastern part: black marine shales potential source of low grade uranium deposits; metallurgical problems of uranium extraction under study for both shales and phosphates: 765.
Sunbury shale: similar to Chattanooga; uranium content increases directly with the percentage of carbon present: 405.
Botanical Exploration
Bibliography: 571.
Bibliography of U.S.G.S. reports: 572, 1004.
Geochemical Exploration
Bibliography: 571.
Bibliography of U.S.G.S. reports: 572, 1004.

UNITED STATES (contd.)

General (contd.)
Geochemical Exploration
Eastern part: two new geochemical methods depending on the high solubility of radon gas in water over a wide range of pH values and of the diffusion of radon gas through residual soil and other types of overburden, were developed by John Harley in the U.S.A.E.C. Health & Safety Laboratory in New York and are being tested in the field in the Triassic lowlands of New Jersey, where rock outcrops are virtually absent and numerous wells provide adequate sample spacing: 1005; lack of bedrock exposures because of extensive, heavy overburden and residual soil makes uranium exploration in this area difficult: 1005.
Geophysical Exploration (Airborne)
Bibliography: 571.
Bibliography of U.S.G.S. reports: 572, 1004.
Eastern part: low-level airborne scintillation surveys have been made in this area: 1005; lack of bedrock exposures because of extensive, heavy overburden and residual soil makes uranium exploration in this area difficult: 1005.
Geophysical Exploration (Ground)
Bibliography: 571.
Bibliography of U.S.G.S. reports: 572, 1004.
Limestones, Uranium-bearing
General: 27, 1110.
Monazite Occurrences
General: monazite has been reported from various localities in California, Colorado, Connecticut, Florida, Idaho, Indiana, Montana, Nevada, New Mexico, North Carolina, Oregon, South Carolina, South Dakota, Texas, Utah, Virginia, Washington, and Wyoming: 1105.

UNITED STATES (contd.)

General (contd.)
Prospector's Guides
Bibliography: 9, 571, 841.
Exploration methods: 1093, 1095, 1098, 1101, 1102, 1106, 1108, 1109.
Mining laws: 1095, 1101, 1102.
Mining methods: 1093, 1106, 1108, 1109.
Uranium: 90, 1093, 1095, 1098, 1101, 1102, 1106, 1108, 1109.
Radioactive Rocks
Eastern seaboard: radioactivity determinations on seven representative granites from Georgia, Maine, Maryland, Massachusetts, and North Carolina; apparatus and procedure used: 898, 899.
Radioactive Waters
Rivers
Mississippi, Hudson, and St. Lawrence Rivers: waters contained 0.048-0.44 x 10^{-8}% U, all much less than in British rivers: 722.
Thorium Occurrences
General: 12, 25.
General: allanite deposits are known in Colorado, New Jersey, New York, North Carolina, Pennsylvania, Texas, Virginia, and Wyoming; while most of the deposits are of mineralogical interest only, commercial shipments have been made from Wyoming, Virginia, and possibly North Carolina: 1105; monazite has been reported from various localities in California, Colorado, Connecticut, Florida, Idaho, Indiana, Montana, Nevada, New Mexico, North Carolina, Oregon, South Carolina, South Dakota, Texas, Utah, Virginia, Washington, and Wyoming: 1105.
Bibliography: 9, 571.

UNITED STATES (contd.)

General (contd.)
Uranium Exploration
Bibliography: 571, 841.
Bibliography of U.S.G.S. reports: 572, 1004.
Eastern Part: exploration work for uranium has been carried on by U.S.A.E.C. and U.S.G.S. but has been hampered by lack of bedrock exposures because of extensive overburden and residual soil; many discoveries have resulted from both government and private prospecting work; U.S.A.E.C. activities were concentrated in areas of the most numerous discoveries, namely, Pennsylvania, New Jersey, and New York; geophysical and geochemical methods used: 1005.
Methods: 1093, 1095, 1098, 1099, 1101, 1102, 1106, 1108, 1109.
Mining laws: 1095, 1101, 1102.
Mining methods: 1093, 1106, 1108, 1109.
Prospectors' guides: 90, 1093, 1095, 1098, 1101, 1102, 1106, 1108, 1109.
U.S.A.E.C. exploration program: U.S.G.S. participation: 405.
Geochemical Exploration
Eastern Part: two new geochemical methods depending on the high solubility of radon gas in water over a wide range of pH values and on the diffusion of radon gas thru residual soil and other types of overburden were developed by John Harley in the U.S.A.E.C. Health and Safety Laboratory in New York and are being tested in the field in the Triassic lowlands of New Jersey, where rock outcrops are virtually absent and numerous wells provide adequate sample spacing: 1005; lack of bedrock exposures because of extensive, heavy overburden and residual soil makes uranium exploration in this area difficult: 1005.

UNITED STATES (contd.)

General (contd.)
Uranium Exploration
Geophysical Exploration (Airborne)
Eastern Part: low-level airborne scintillation surveys have been made in this area: 1005; lack of bedrock exposures because of extensive, heavy overburden and residual soil makes uranium exploration in this area difficult: 1005.
Uranium Occurrences
General: 12, 13, 25, 90, 841, 1093, 1095, 1098, 1099, 1101, 1102, 1103, 1106, 1108, 1109.
Antrim shale: carbonaceous shale carrying about 0.01% eU308: 642; black shale similar to the Chattanooga; uranium content increases directly with the percentage of carbon present: 405.
Appalachian region: one of the most promising and least prospected areas in the United States since the Appalachians extend from Alabama and Georgia to Quebec and uranium minerals have been found in Alabama, Kentucky, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Tennessee and Vermont: 1093; uranium present in pegmatites and disseminated deposits in granite in the pegmatite belt that follows the trend of the Appalachian Mountains with uranium occurrences reported from New York and Vermont on the north to Georgia on the south: 1106; uranium may also be present in placer deposits in the bed of streams that drain the Appalachian Mountains: 1106; some of the best uranium possibilities seem to lie in the long valleys of western New Jersey and eastern Pennsylvania and in the plateaus of Alabama, northern Kentucky and Ohio: 1093.

UNITED STATES (contd.)

General (contd.)
Uranium Occurrences
Bibliography: 9, 10, 571, 841.
Bibliography of U.S.G.S. reports: 572, 1004.
Black Shale, Uranium-bearing
General: 27.
Antrim shale: carbonaceous shale carrying about 0.01% eU3O8: 642; similar to Chattanooga; uranium content increases directly with the percentage of carbon present: 405.
Chattanooga shale: 405; carbonaceous shale carrying about 0.01% eU3O8: 642; uranium content of the Chattanooga and related shales appears to decrease from Tennessee north to Michigan as the thickness of the formation increases but Russell believes that the uranium content also increases as the thickness of formation increases westward: 1103.
Eastern Part: black marine shales potential source of low grade uranium deposits; metallurgical problems of uranium extraction under study for both shales and phosphates: 765.
Sunbury shale: similar to Chattanooga; uranium content increases directly with the percentage of carbon present: 405.
Chattanooga shale: carbonaceous shale carrying about 0.01% eU3O8: 642; uranium-bearing black shale: 405; uranium content of the Chattanooga and related shales appears to decrease from Tennessee to Michigan as the thickness of the formation increases but Russell believes that the uranium content also increases as the thickness of the formation increases westward: 1103.

UNITED STATES (contd.)

General (contd.)
Uranium Occurrences
Distribution of deposits: 841.
Eastern Part: primary uranium minerals in pyrometasomatic deposits in Franklin limestone of New Jersey reported by A. P. Butler, of U.S.G.S.; deposits of interest because they indicate presence of primary uranium minerals in Appalachian region: 1069; black marine shales potential source of low grade uranium deposits; metallurgical problems of uranium extraction under study for both shales and phosphates: 765.
Exploration methods: 841, 1093, 1095, 1098, 1099, 1102, 1106, 1108, 1109.
Geochemistry: 1103.
Geology: 841, 1093, 1095, 1098, 1099, 1101, 1102, 1103, 1106, 1108, 1109.
Map showing location and types of uranium deposits: 1110.
Mineralogy: 1093, 1095, 1098, 1099, 1101, 1102, 1103, 1106, 1108, 1109.
Mining methods: 1093, 1095, 1099, 1102, 1106, 1108, 1109.
Ore controls: 1103.
Origin: 841, 1103.
Rivers
Mississippi, Hudson, and St. Lawrence Rivers: waters contained 0.048-0.44 x 10^{-8}% U, all much less than in British rivers: 722.
Sunbury shale: black shale similar to Chattanooga; uranium content increases directly with the percentage of carbon present: 405.
Types of uranium deposits: 841, 1093, 1095, 1098, 1099, 1101, 1102, 1103, 1106, 1108, 1109.

UNITED STATES (contd.)

General (contd.)
Uranium Occurrences
Types of Uranium Deposits
Black shale, uranium-bearing: 27, 1103.
Caliche deposits, uranium-bearing: 1110.
Carbonaceous deposits, uranium-bearing: 1103.
Coal, uranium-bearing: 1103, 1110.
Deposits actively or formerly mined for uranium or potentially minable under June 1955 market conditions: 1110.
Deposits too low in grade to be mined for uranium alone, but may yield byproduct uranium: 1110.
Deposits of potential, possible importance but unevaluated to date: 1110.
Igneous rocks, uranium deposits in: 1103.
Limestone, uranium-bearing: 27, 1110.
Pegmatite, uranium-bearing: 1103.
Phosphorite, uranium-bearing: 1103, 1110.
Placer deposits: 1110.
Replacement deposits: 1103.
Sandstone-type deposits: 1103, 1110.
Shales, uranium-bearing: 1110.
Vein deposits: 62, 1103, 1110.
Vein and related deposits: 1110.
Eastern United States
Crystalline rocks, deposits of uranium in: uranium as uraninite or uranothorite occurs in crystalline rocks at 11 localities from the western Adirondacks to North Carolina, often associated with iron-rich rocks or with biotite, chlorite, hornblende, or an accessory iron mineral: 1005.

UNITED STATES (contd.)

General (contd.)
Uranium Occurrences
Types of Uranium Deposits
Eastern United States
Hydrothermal vein deposits: Michigan: 62; New Jersey: 62.
Intergrowths with biotite and hornblende: uranium minerals found when iron oxides and sulphides are absent: 1005.
Iron deposits, uranium bearing: uranium associated with iron either in magnetite-rich gneiss and schist or disseminated pyrite deposits in sandstone: 1005.
Magnetite, uranium-bearing: one occurrence in Pennsylvania of titaniferous magnetite in schist with auxiliary uranium: 1005.
Radioactive slag: uraniferous slag from a Revolutionary War iron furnace found in New York and slightly radioactive slag also is reported in Georgia and Alabama: 1005.
Sedimentary deposits: one small occurrence of uranium with a trace of Cu; one small occurrence of uranium associated with minor galena: 1005.
Waters, Uranium-bearing
Rivers
Mississippi, Hudson, and St. Lawrence Rivers: waters contained 0.048-0.44 x 10^{-8}% U, all much less than in British rivers: 722.
Uranium Processes
Bibliography of U.S.G.S. reports: 572, 1004.
Extraction methods: 1099.
Milling methods: 1099.
Tests for uranium: 1099.

UNITED STATES (contd.)

General (contd.)
Uranium Purchases
Pennsylvania
Jim Thorpe (formerly Mauch Chunk): carnotite deposits in sandstone, similar to Colorado Plateau, on land of Lehigh Coal and Navigation Co. to be mined; first contract for purchase of uranium ore in eastern United States being negotiated between U.S.A.E.C. and company: 1083.
Waters, Uranium-bearing
Rivers
Mississippi, Hudson, and St. Lawrence Rivers: waters contained 0.048-0.44 x 10^{-8}% U, all much less than in British rivers: 722.

Age Determinations
United States-Age Determinations: See under general and individual state names and under Index III, Age Determinations-United States: 925.

Allanite Occurrences
See under general and individual state names and under Index III, Thorium Occurrences-United States: 1105.

Bibliographies
See under general and individual state names and under Index III, Bibliographies-United States: 9, 10, 571, 841.
Bibliography of U.S.G.S. reports: 572, 1004.

Black Shales, Uranium-Bearing
United States-Black Shales, Uranium-bearing: See under general and individual state names and under Index III, Black Shales, Uranium-bearing-United States: 27, 405, 642, 765, 1103.

UNITED STATES (contd.)

Botanical Exploration
Bibliography: 571.
Bibliography of U.S.G.S. reports: 572, 1004.

Geochemical Exploration
Bibliography: 571.
Bibliography of U.S.G.S. reports: 572, 1004.

Geophysical Exploration (Airborne)
Bibliography: 571.
Bibliography of U.S.G.S. reports: 572, 1004.

Geophysical Exploration (Ground)
Bibliography: 571.
Bibliography of U.S.G.S. reports: 572, 1004.

Limestones, Uranium-bearing
United States-Limestones, Uranium-bearing: See under general and individual state names and under Index III, Limestones, Uranium-bearing-United States: 27, 1110.

Monazite Occurrences
United States-Monazite Occurrences: See under general and individual state names and under Index III, Thorium Occurrences-United States: 631, 732, 1105.

Northeast Part
Monazite Occurrences
Wissahickon schist of northern Maryland and southeastern Pennsylvania, exact locations unnamed: monazite occurred in both the fresh and weathered samples of Wissahickon schist; using a value of 1 for garnet, the mineral least resistant to weathering, monazite was given a value of 40, showing that, according to one series of samples, it is quite resistant to weathering: 732.

UNITED STATES (contd.)

Northeast Part (contd.)
Monazite Occurrences
Rhode Island
Block Island: monazite is present as a detrital species only in the continental shelf sediments off this island and was not reported at five other shore localities from Maine to Maryland: 631.
Samarskite Occurrences
Appalachian region: pegmatites of Mid-Paleozoic age occur in Appalachian crystallines from Newry, Maine, to Mitchell, South Carolina; no pegmatite has yielded a ton of uranium and most furnished only museum specimens; samarskite is the usual mineral and small amounts of uraninite are reported from northwest Adirondack Mountains: 642.
Thorium Occurrences
Appalachian region: pegmatites of Mid-Paleozoic age occur in Appalachian crystallines from Newry, Maine, to Mitchell, South Carolina; no pegmatite has yielded a ton of uranium and most furnished only museum specimens; samarskite is the usual mineral and small amounts of uraninite are reported from northwest Adirondack Mountains: 642.
Wissahickon schist of northern Maryland and southeastern Pennsylvania, exact locations unnamed: monazite occurred in both the fresh and weathered samples of Wissahickon schist; using a value of 1 for garnet, the mineral least resistant to weathering, monazite was given a value of 40, showing that, according to one series of samples, it is quite resistant to weathering: 732.

UNITED STATES (contd.)

Northeast Part (contd.)
Thorium Occurrences
Rhode Island
Block Island: monazite is present as a detrital species only in the continental shelf sediments off this island and was not reported at five other shore localities from Maine to Maryland: 631.
Uraninite Occurrences
Appalachian region: pegmatites of Mid-Paleozoic age occur in Appalachian crystallines from Newry, Maine, to Mitchell, South Carolina; no pegmatite has yielded a ton of uranium and most furnished only museum specimens; samarskite is the usual mineral and small amounts of uraninite are reported from northwest Adirondack Mountains: 642.
Uranium Occurrences
Appalachian region: pegmatites of Mid-Paleozoic age occur in Appalachian crystallines from Newry, Maine, to Mitchell, South Carolina; no pegmatite has yielded a ton of uranium and most furnished only museum specimens; samarskite is the usual mineral and small amounts of uraninite are reported from northwest Adirondack Mountains: 642.
Western Appalachian oil fields: thin source strata in oil fields and oil shales may be potential sources of uranium: 642.

Prospector's Guides
United States-Prospector's Guides: See under general and individual state names and under Index III, Prospector's Guides-United States: 90, 1093, 1095, 1098, 1101, 1102, 1106, 1108, 1109.
Bibliography: 9, 571, 841.

UNITED STATES (contd.)

Radioactive Rocks
United States-Radioactive Rocks:
See under general and individual state names and under Index III, Radioactive Rocks-United States: 898, 899.

Radioactive Waters
United States-Radioactive Waters:
See under general and individual state names and under Index III, Radioactive Waters-United States: 722.

Samarskite Occurrences
United States-Samarskite Occurrences:
See under general and individual state names and under Index III, Samarskite Occurrences-United States: 642.

Thorium Occurrences
United States-Thorium Occurrences:
See under general and individual state names and under Index III, Thorium Occurrences-United States: 12, 25, 631, 642, 732, 1105.
Bibliography: 9, 571.

Uraninite Occurrences
United States-Uraninite Occurrences:
See under general and individual state names and under Index III, Uraninite Occurrences-United States: 642.

Uranium Exploration
United States-Uranium Exploration:
See under general and individual state names and under Index III, Uranium Exploration-United States: 90, 405, 1005, 1093, 1095, 1098, 1099, 1101, 1102, 1106, 1108, 1109.
Bibliography: 9, 571, 841.
Bibliography of U.S.G.S. reports: 572, 1004.

UNITED STATES (contd.)

Uranium Occurrences
United States-Uranium Occurrences:
See under general and individual state names and under Index III, Uranium Occurrences-United States: 12, 13, 25, 27, 62, 90, 405, 642, 722, 765, 841, 1005, 1069, 1093, 1095, 1098, 1099, 1101, 1102, 1103, 1106, 1108, 1109, 1110.
Bibliography: 9, 10, 571, 841.
Bibliography of U.S.G.S. reports: 572, 1004.

Uranium Processes
United States-Uranium Processes:
See under general and individual state names and under Index III, Uranium Processes-United States: 1099.
Bibliography of U.S.G.S. reports: 572, 1004.

Uranium Prospecting
United States-See Uranium Exploration.

Uranium Purchases
United States-Uranium Purchases:
See under general and individual state names and under Index III, Uranium Purchases-United States: 1083.

Waters, Uranium-bearing
United States-Waters, Uranium-bearing:
See under general and individual state names and under Index III, Waters, Uranium-bearing-United States: 722.

VERMONT

General
Dolomite, Uranium-bearing
Milton dolomite: uranium: 443; uranium in dolomite of Cambrian age: 841; dolomite carrying uranium in significant amounts: 1106.
Limestone, Uranium-bearing
General: uranium-bearing limestone : 27; uranium in limestone in northwest part of state: 426.
Prospectors' Guides
Exploration methods: 1101.
Mining laws: 1101.
Uranium: 1101.
Uranium Exploration
Methods: 1101.
Mining laws: 1101.
Prospectors' guides: 1101.
Uranium Occurrences
General: uranium-bearing limestones: 27; uranium in limestone in northwest part of state: 426.
Appalachian region: one of the most promising and least prospected areas in the United States since the Appalachians extend from Alabama and Georgia to Quebec and uranium minerals have been found in Alabama, Kentucky, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Tennessee, and Vermont: 1093; uranium present in pegmatites and disseminated deposits in granite in the pegmatite belt that follows the trend of the Appalachian Mountains with uranium occurrences reported from New York and Vermont on the north to Georgia on the south: 1106; uranium may also be present in placer deposits in the beds of streams that drain the Appalachian Mountains: 1106.

VERMONT (contd.)

General (contd.)
Uranium Occurrences
Bibliography of U.S.G.S. reports: 572, 1004.
Milton dolomite: uranium: 443; uranium in dolomite of Cambrian age: 841; dolomite carrying uranium in significant amounts: 1106.
Dolomite, Uranium-bearing
Milton dolomite: uranium: 443; uranium in dolomite of Cambrian age: 841; dolomite carrying uranium in significant amounts: 1106.
Limestone, Uranium-bearing
General: uranium-bearing limestone: 27; uranium in limestone in northwest part of state: 426.

Age Determinations
Vermont-Age Determinations: See under individual county names and under Index III, Age Determinations-Vermont: 1039.

Allanite Occurrences
Vermont-Allanite Occurrences: See under individual county names and under Index III, Thorium Occurrences-Vermont: 698, 716, 717, 719, 790, 791, 854, 1020, 1023.

Bibliographies
Uranium Occurrences
Bibliography of U.S.G.S. reports: 572, 1004.

Caledonia County
Allanite Occurrences
Hardwick
Buffalo Hill quarry on Buffalo Hill, 2½ mi. SW of Hardwick: allanite as an accessory mineral in Hardwick granite: 716; allanite as an accessory mineral with pyrite, magnetite, apatite, and zircon in a quartz monzonite granite: 717.

VERMONT (contd.)

Caledonia County (contd.)
Allanite Occurrences
Kirby
Kearney Hill quarry on W foot of Kirby Mountain 2¼ mi. NW of North Concord: allanite, pyrite, apatite, zircon, and rutile as accessory minerals in light gray quartz monzonite granite: 717.
Newark
Bugbee, Alexander, & Packer prospect on W side of a ridge between Center Pond and East Branch of the Passumpsic: allanite, magnetite, pyrite, titanite as accessory minerals in "Newark pink", a biotite granite of light pinkish gray color: 717.
Packer quarry in E part of Newark on W side of a ridge between Center or Island Pond and the East Branch of the Passumpsic River: allanite as an accessory mineral in "Newark pink" granite: 716.
Ryegate
Frazer (formerly called Hall's) quarry on SW side of SE spur of Blue Mountain about 950 ft. above South Ryegate: allanite, titanite, apatite, zircon as accessory minerals in gray quartz monzonite granite; limonite in rusty band at base of granite sheet comes from allanite and biotite crystals as shown in thin section: 717.
Morrison quarry on SW side of Blue Mountain about 940 ft. above South Ryegate: rare particles of allanite occur in the schist inclusions in the medium gray quartz monzonite granite: 717.

VERMONT (contd.)

Caledonia County (contd.)
Allanite Occurrences
Ryegate
Rosa quarry NE side of SE spur of Blue Mountain about 1100 ft. above South Ryegate: allanite and apatite in a "coarse gray" biotite granite, medium in blueish-gray shade and texture: 717.
Woodsville quadrangle
Blue Mountain: allanite in 50% or more of thin sections, and in the Ryegate granodiorite: 1020.
Groton area: allanite in 50% or more of thin sections, and in the Ryegate granodiorite: 1020.
Groton area
Benzie quarry in Groton about 1 mi. SW of Wells River bridge at Groton: allanite as an accessory mineral in "Vermont blue" granite: 716.
Benzie quarry 1 mi. SW of Wells River bridge at Groton and 4½ mi. SW of Blue Mountain in Ryegate: allanite, apatite, zircon, titanite, pyrite as accessory minerals in the "Vermont blue" granite, a quartz monzonite: 717.
Thorium Occurrences
Hardwick
Buffalo Hill quarry on Buffalo Hill, 2½ mi. SW of Hardwick: allanite as an accessory mineral Hardwick granite: 716; allanite as an accessory mineral with pyrite, magnetite, apatite, and zircon in the quartz monzonite granite: 717.

VERMONT (contd.)

Caledonia County (contd.)
Thorium Occurrences
Kirby
Kearney Hill quarry on W foot of Kirby Mountain 2¼ mi. NW of North Concord: allanite, pyrite, apatite, zircon, and rutile as accessory minerals in light gray quartz monzonite granite: 717.
Newark
Bugbee, Alexander, & Packer prospect on W side of a ridge between Center Pond and East Branch of the Passumpsic: allanite, magnetite, pyrite, titanite as accessory minerals in "Newark pink", a biotite granite of light pinkish gray color: 717.
Packer quarry in E part of Newark on W side of a ridge between Center or Island Pond and the East Branch of the Passumpsic River: allanite as an accessory mineral in "Newark pink" granite: 716.
Ryegate
Frazer (formerly called Hall's) quarry on SW side of SE spur of Blue Mountain about 950 ft. above South Ryegate: allanite, titanite, apatite, zircon as accessory minerals in gray quartz monzonite granite; limonite in rusty band at base of granite sheet comes from allanite and biotite crystals as shown in thin section: 717.
Morrison quarry on SW side of Blue Mountain about 940 ft. above South Ryegate: rare particles of allanite occur in the schist inclusions in the medium gray quartz monzonite granite: 717.

VERMONT (contd.)

Caledonia County (contd.)
Thorium Occurrences
Ryegate
Rosa quarry NE side of SE spur of Blue Mountain about 1100 ft. above South Ryegate: allanite and apatite in a "coarse gray" biotite granite, medium in bluish-gray shade and texture: 717.
Woodsville quadrangle
Blue Mountain: allanite in 50% or more of thin sections, and in the Ryegate granodiorite: 1020.
Groton area: allanite in 50% or more of thin sections, and in the Ryegate granodiorite: 1020
Groton area
Benzie quarry in Groton about 1 mi. SW of Wells River bridge at Groton: allanite as an accessory mineral in "Vermont blue" granite: 716.
Benzie quarry 1 mi. SW of Wells River bridge at Groton and 4½ mi. SW of Blue Mountain in Ryegate: allanite, apatite, zircon, titanite, pyrite, as accessory minerals in the "Vermont blue" granite, a quartz monzonite: 717.

Chittenden County
Age Determinations
Burlington: analysis of sample from camptonite dike cutting quartzite in quarry, each value being followed by probable error (p.e.), gave: 2.64×10^{-5} cc. He/g. (p.e. 0.14), 2.70×10^{-12} g. Ra/g. (p.e. 0.06), 2.49×10^{-6} g. Th/g. (p.e. 0.13), age, 155 m.y.: 1039.

VERMONT (contd.)

Chittenden County (contd.)
Dolomite, Uranium-bearing
Central New England Province
Milton Area
General: uranium in Milton dolomite of Cambrian age: 841; Milton dolomite, abnormally radioactive showing up to 0.029% eU and 0.018% U, radioactivity directly associated with black chert-like inclusions in intraformational breccias in sandy dolomite, and appears to be related to the phosphate content as well; at Milton, Vermont, the black petroliferous clay galls in an intraformational breccia have up to 0.018% U; manner of occurrence of uranium and its areal distribution are indicative of syngenetic deposition; deposits as now known are too small and spotty to be of economic importance: 842.
Area on U.S. Highway 7, 2.2 mi. N of junction with U.S. Highway 2, SE of Milton and Checkerberry Village: abnormally radioactive zone of soil and float extending for about 20 ft. on E side of highway near center of a patch of woodland, throughout which radioactive soils and rocks are also irregularly distributed; radiometric and chemical analyses made on four samples of dolomite with chert-like breccia gave the following range of results, 0.002-0.022% eU, 0.003-0.019% U, 0.002 and 0.003% ThO_2 in two samples and no Th in other two, 0.01-0.03% V_2O_5, and 2.34-7.19% P_2O_5; there seems to be a relationship between phosphate content and radioactivity of samples: 842.

VERMONT (contd.)

Chittenden County (contd.)
Dolomite, Uranium-bearing
Central New England Province
Milton Area
Area along lane extending E from U.S. Highway 7 at a location about 0.3 mi. NE of above, SE of Milton and Checkerberry Village: outcrops in bed of intermittent stream, and on hill E of stream are abnormally radioactive as is roadside soil; some purple fluorite crystals present; radiometric and chemical analyses of six samples of dolomite with black chert-like breccia, some also having fluorite inclusions, gave ranges of 0.003-0.016% eU, 0.002-0.007% U; similar analyses of 14 samples of black chert-like fragments gave ranges of 0.001-0.019% eU, 0.000-0.014% U, of a sandy dolomite sample, 0.001% eU and no U, and of five samples of dolomite with inclusions of black chert-like fragments, 0.001-0.029% eU and 0.000-0.018% U; two other localities to the N and S of this area show abnormally radioactive soil zones but no samples were taken and the estimated radioactivity is of the same magnitude as at the other localities: 842.

VERMONT (contd.)

Chittenden County (contd.)
Dolomite, Uranium-bearing
Central New England Province
Milton Area
Cobble Hill, area 0.5 mi. SW of top of, SE of Milton and Checkerberry Village: radiometric and chemical analyses of two samples of dolomite with black chert-like breccia and phosphate bloom gave only 0.010 and 0.015% eU while a third showed no eU but gave 0.006% U and 0.001% ThO_2, 0.01% V_2O_5, and 4.86% P_2O_5; similar study of two samples of dolomite with inclusions of black chert-like fragments gave no eU, 0.009% U, 0.04% V_2O_5, and 8.06% P_2O_5 for the first and for the second, 0.015% eU and 0.007% U: 842.
Cobble Hill, summit of, 4 mi. S of Milton: radiometric and chemical analyses of dolomite with black breccia, gave 0.003% eU, 0.002% U, 0.03% V_2O_5, and 0.11% P_2O_5: 842.
Radioactive Rocks
Burlington: analysis of sample from camptonite dike cutting quartzite in quarry, each value being followed by probable error (p.e.), gave: 2.64×10^{-5} cc. He/g. (p.e. 0.14), 2.70×10^{-12} g. Ra/g. (p.e. 0.06), 2.49×10^{-6} g. Th/g. (p.e. 0.13), age, 155 m.y.: 1039.
Burlington from quarry: sample of camptonite from dike, possibly of Triassic age cutting Cambrian quartzite, mean value of radioactivity $0.077 \pm 0.018 \times 10^{-12}$ g. Ra/g. rock: 745.

VERMONT (contd.)

Chittenden County (contd.)
Radioactive Rocks
Central New England Province
Milton Area
General: Milton dolomite, abnormally radioactive showing up to 0.029% eU and 0.018% U; radioactivity directly associated with black chert-like inclusions in intraformational breccias in sandy dolomite, and appears to be related to the phosphate content as well; at Milton, Vermont, the black petroliferous clay galls in an intraformational breccia have up to 0.018% U; manner of occurrence of uranium and its areal distribution are indicative of syngenetic deposition deposits as now known are too small and spotty to be of economic importance: 842.
Area of U.S. Highway 7, 2.2 mi. N of junction with U.S. Highway 2, SE of Milton and Checkerberry Village: abnormally radioactive zone of soil and float extending for about 20 feet on E side of highway near center of a patch of woodland, throughout which radioactive soils and rocks are also irregularly distributed; radiometric and chemical analyses made on four samples of dolomite with chert-like breccia gave the following range of results, 0.002-0.022% eU, 0.003-0.019% U, 0.002 and 0.003% ThO_2 in two samples and no Th in other two, 0.01-0.03% V_2O_5, and 2.34-7.19% P_2O_5; there seems to be a relationship between phosphate content and radioactivity of samples: 842.

VERMONT (contd.)

Chittenden County (contd.)
Radioactive Rocks
Central New England Province
Milton Area
Area along lane extending E from U.S. Highway 7 at a location about 0.3 mi. NE of above, SE of Milton and Checkerberry Village: outcrops in bed of intermittent stream, and on hill E of stream are abnormally radioactive as is roadside soil; some purple fluorite crystals present; radiometric and chemical analyses of six samples of dolomite with black chert-like breccia, some also having fluorite inclusions, gave ranges of 0.003-0.016% eU, 0.002-0.007% U; similar analyses of 14 samples of black chert-like fragments gave ranges of 0.001-0.019% eU, 0.000-0.014% U, of a sandy dolomite sample, 0.001% eU and no U, and of five samples of dolomite with inclusions of black chert-like fragments, 0.001-0.029% eU and 0.000-0.018% U; two other localities to the N and S of this area show abnormally radioactive soil zones but no samples were taken and the estimated radioactivity is of the same magnitude as at the other localities: 842.

VERMONT (contd.)

Chittenden County (contd.)
Radioactive Rocks
Central New England Province
Milton Area
Cobble Hill, area 0.5 mi. SW of top of, SE of Milton and Checkerberry Village: radiometric and chemical analyses of two samples of dolomite with black chert-like breccia and phosphate bloom gave only 0.010 and 0.015% eU while a third showed no eU but gave 0.006% U and 0.001% ThO_2, 0.01% V_2O_5, and 4.86% P_2O_5; similar study of two samples of dolomite with inclusions of black chert-like fragments gave no eU, 0.009% U, 0.04% V_2O_5, and 8.06% P_2O_5 for the first and for the second, 0.015% eU and 0.007% U: 842.
Cobble Hill, summit of, 4 mi. S of Milton: radiometric and chemical analyses of dolomite with black breccia, gave 0.003% eU, 0.002% U, 0.03% V_2O_5, and 0.11% P_2O_5: 842.
Age Determinations
Burlington: analysis of sample from camptonite dike cutting quartzite in quarry, each value being followed by probable error (p.e.) gave: 2.64×10^{-5} cc. He/g. (p.e. 0.14), 2.70×10^{-12} g. Ra/g. (p.e. 0.06), 2.49×10^{-6} g. Th/g. (p.e. 0.13), age, 155 m.y.: 1039.
Thorium Occurrences
Burlington: analysis of sample from camptonite dike cutting quartzite in quarry, each value being followed by probable error (p.e.), gave: 2.64×10^{-5} cc. He/g. (p.e. 0.14), 2.70×10^{-12} g. Ra/g. (p.e. 0.06), 2.49×10^{-6} g. Th/g. (p.e. 0.13), age, 155 m.y.: 1039.

VERMONT (contd.)

Chittenden County (contd.)
Thorium Occurrences
Central New England Province
Milton Area
Area on U.S. Highway 7, 2.2 mi. N of junction with U.S. Highway 2, SE of Milton and Checkerberry Village: abnormally radioactive zone of soil and float extending for about 20 feet on E side of highway near center of a patch of woodland, throughout which radioactive soils and rocks are also irregularly distributed; radiometric and chemical analyses made on four samples of dolomite with chert-like breccia gave the following range of results, 0.002-0.022% eU, 0.003-0.019% U, 0.002 and 0.003% ThO_2 in two samples and no Th in other two, 0.01-0.03% V_2O_5, and 2.34-7.19% P_2O_5; there seems to be a relationship between phosphate content and radioactivity of samples: 842.
Cobble Hill, area 0.5 mi. SW of top of, SE of Milton and Checkerberry Village: radiometric and chemical analyses of two samples of dolomite with black chert-like breccia and phosphate bloom gave only 0.010 and 0.015% eU while a third showed no eU but gave 0.006% U and 0.001% ThO_2, 0.01% V_2O_5, and 4.86% P_2O_5; similar study of two samples of dolomite with inclusions of black chert-like fragments gave no eU, 0.009% U, 0.04% V_2O_5, and 8.06% P_2O_5 for the first and for the second, 0.015% eU and 0.007% U: 842.

VERMONT (contd.)

Chittenden County (contd.)
Uranium Occurrences
Central New England Province
Milton Area
General: uranium in Milton dolomite of Cambrian age: 841;
Milton dolomite, abnormally radioactive showing up to 0.029% eU and 0.018% U: radioactivity directly associated with black chert-like inclusions in intraformational breccias in sandy dolomite, and appears to be related to the phosphate content as well; at Milton, Vermont, the black petroliferous clay galls in an intraformational breccia have up to 0.018% U; manner of occurrence of uranium and its areal distribution are indicative of syngenetic deposition; deposits as now known are too small and spotty to be of economic importance: 842.
Area on U.S. Highway 7, 2.2 mi. N of junction with U.S. Highway 2, SE of Milton and Checkerberry Village: abnormally radioactive zone of soil and float extending for about 20 feet on E side of highway near center of a patch of woodland, throughout which radioactive soils and rocks are also irregularly distributed; radiometric and chemical analyses made on four samples of dolomite with chert-like breccia gave the following range of results, 0.002-0.022% eU, 0.003-0.019% U, 0.002 and 0.003% ThO_2 in two samples and no Th in other two, 0.01-0.03% V_2O_5, and 2.34-7.19% P_2O_5; there seems to be a relationship between phosphate content and radioactivity of samples: 842.

VERMONT (contd.)

Chittenden County (contd.)
Uranium Occurrences
Central New England Province
Milton Area
Area along lane extending E from U.S. Highway 7 at a location about 0.3 mi. NE of above, SE of Milton and Checkerberry Village: outcrops in bed of intermittent stream, and on hill E of stream are abnormally radioactive as is roadside soil; some purple fluorite crystals present; radiometric and chemical analyses of six samples of dolomite with black chert-like breccia, some also having fluorite inclusions, gave ranges of 0.003-0.016% eU, 0.002-0.007% U; similar analyses of 14 samples of black chert-like fragments give ranges of 0.001-0.019% eU, 0.000-0.014% U, of a sandy dolomite sample, 0.001% eU and no U, and of five samples of dolomite with inclusions of black chert-like fragments, 0.001-0.029% eU and 0.000-0.018% U; two other localities to the N and S of this area show abnormally radioactive soil zones, but no samples were taken and the estimated radioactivity is of the same magnitude as at the other localities: 842.

VERMONT (contd.)

Chittenden County (contd.)
Uranium Occurrences
Central New England Province
Milton Area
Cobble Hill, area 0.5 mi. SW of top of, SE of Milton and Checkerberry Village: radiometric and chemical analyses of two samples of dolomite with black chert-like breccia and phosphate bloom gave only 0.010% and 0.015% eU while a third showed no eU but gave 0.006% U and 0.001% ThO_2, 0.01% V_2O_5, and 4.86% P_2O_5; similar study of two samples of dolomite with inclusions of black chert-like fragments gave no eU, 0.009% U, 0.04% V_2O_5, and 8.06% P_2O_5 for the first and for the second, 0.015% eU and 0.007% U: 842.
Cobble Hill, summit of, 4 mi. S of Milton: radiometric and chemical analyses of dolomite with black breccia, gave 0.003% eU, 0.002% U, 0.03% V_2O_5, and 0.11% P_2O_5: 842.
Dolomite, Uranium-bearing
Central New England Province
Milton Area
General: uranium in Milton dolomite of Cambrian age: 841.

VERMONT (contd.)

Chittenden County (contd.)
Uranium Occurrences
Dolomite, Uranium-bearing
Central New England Province
Milton Area
Milton dolomite, abnormally radioactive showing up to 0.029% eU and 0.018% U; radioactivity directly associated with black chert-like inclusions in intraformational breccias in sandy dolomite, and appears to be related to the phosphate content as well; at Milton, Vermont, the black petroliferous clay galls in an intraformational breccia have up to 0.018% U; manner of occurrence of uranium and its areal distribution are indicative of syngenetic deposition; deposits as now known are too small and spotty to be of economic importance: 842.
Area on U.S. Highway 7, 2.2 mi. N of junction with U.S. Highway 2, SE of Milton and Checkerberry Village: abnormally radioactive zone of soil and float extending for about 20 feet on E side of highway near center of a patch of woodland, throughout which radioactive soils and rocks are also irregularly distributed; radiometric and chemical analyses made on four samples of dolomite with chert-like breccia gave the following range of results, 0.002-0.022% eU, 0.003-0.019% U; 0.002 and 0.003% ThO_2 in two samples and no Th in other two, 0.01-0.03% V_2O_5, and 2.34-7.19% P_2O_5, there seems to be a relationship between phosphate content and radioactivity of samples: 842.

VERMONT (contd.)

Chittenden County (contd.)
Uranium Occurrences
Dolomite, Uranium-bearing
Central New England Province
Milton Area
Area along lane extending E from U.S. Highway 7 at a location about 0.3 mi. NE of above, SE of Milton and Checkerberry Village: outcrops in bed of intermittent stream, and on hill E of stream, are abnormally radioactive as is roadside soil; some purple fluorite crystals present; radiometric and chemical analyses of six samples of dolomite with black chert-like breccia, some also having fluorite inclusions, gave ranges of 0.003-0.016% eU, 0.002-0.007% U; similar analyses of 14 samples of black chert-like fragments gave ranges of 0.001-0.019% eU, 0.000-0.014% U, of a sandy dolomite, 0.001% eU and no U, and of five samples of dolomite with inclusions of black chert-like fragments, 0.001-0.029% eU and 0.000-0.018% U; two other localities to the N and S of this area show abnormally radioactive soil zones but no samples were taken and the estimated radioactivity is of the same magnitude as at the other localities: 842.

VERMONT (contd.)

Chittenden County (contd.)
Uranium Occurrences
Dolomite, Uranium-bearing
Central New England Province
Milton Area
Cobble Hill, area 0.5 mi. SW of top of, SE of Milton and Checkerberry Village: radiometric and chemical analyses of two samples of dolomite with black chert-like breccia and phosphate bloom gave only 0.010 and 0.015% eU while a third showed no eU but gave 0.006% U and 0.001% ThO_2, 0.01% V_2O_5, and 4.86% P_2O_5; similar study of two samples of dolomite with inclusions of black chert-like fragments gave no eU, 0.009% U, 0.04% V_2O_5, and 8.06% P_2O_5 for the first and for the second, 0.015% eU and 0.007% U: 842.
Cobble Hill, summit of, 4 mi. S of Milton: radiometric and chemical analyses of dolomite with black breccia, gave 0.003% eU, 0.002% U, 0.03% V_2O_5, and 0.11% P_2O_5: 842.

Dolomite, Uranium-bearing
Vermont-Dolomite, Uranium-bearing: See under individual county names and under Index III, Dolomite, Uranium-bearing-Vermont: 443, 841, 1106.

Essex County
Allanite Occurrences
Mount Monadnock: allanite as an accessory mineral in gray porphyritic syenite, quartz syenite, and granite: 698.
Norton mine at Mount Monadnock: allanite common in large rounded crystals in syenite; allanite as an accessory mineral in aplite stringers: 1023.

VERMONT (contd.)

Essex County (contd.)
Radioactive Rocks
Central New England Province
Lake, in a 4-mile zone along Vermont Highway 114 starting 5 mi. S of Canadian border: radioactivity of a light-gray, medium-grained biotite granite in area mapped as Silurian-Carboniferous granite, 0.003-0.005% eU: 842.
Vermont Highway 105 for 18 mi. between Island Pond and Bloomfield: radioactivity of glacial material on area mapped as schist and phyllite but with no outcrops, 0.003-0.005% eU; abnormal radioactivity is spotty according to results of foot traverses: 842.
Thorium Occurrences
Mount Monadnock: allanite as an accessory mineral in gray porphyritic syenite, quartz syenite, and granite: 698.
Norton mine at Mount Monadnock: allanite common in large rounded crystals in syenite; allanite as an accessory in aplite stringers: 1023.

Lamoille County
Radioactive Rocks
Belvidere Mountain: radioactivity determinations on samples of partially serpentinized dunite and serpentinite gave the following results: 0.004 and 0.006 x 10^{-12} g. Ra/g. for partially serpentinized dunites and 0.062 and 0.023 x 10^{-12} g. Ra/g. for the serpentinite; methods used: 724; serpentinite and other partially serpentinized rocks: radium content of four samples showed 0.004 and 0.006 x 10^{-12} g. Ra/g. rock for serpentinized peridotite and serpentine respectively; and 0.23 and 0.62 x 10^{-12} g. Ra/g. rock for serpentinite: 216; serpentinite and other partially serpentinized rocks: petrographic description: 216.

VERMONT (contd.)

Limestones, Uranium-bearing
Vermont-Limestones, Uranium-Bearing: See under individual county names and under Index III, Limestones, Uranium-bearing-Vermont: 27, 426.

Monazite Occurrences
Vermont-Monazite Occurrences: See under individual county names and under Index III, Thorium Occurrences-Vermont: 719, 790.

Orange County
Allanite Occurrences
Jones Dark quarry in Williamstown: allanite present in "dark Barre" granite: 716
Topsham
Ricker quarry at W foot of Pine Mountain about 5½ mi. WSW of Blue Mountain: allanite, apatite, titanite, and zircon as accessory minerals in the "Pine Mountain" quartz monzonite granite: 717.
Woodsville quadrangle
Waits River formation: allanite as an accessory mineral, present in over 50% of the thin sections of the tonalite dikes and the leucocratic quartz monzonite dikes and in less than 50% of the thin sections of the granodiorite dikes: 1020.
Radioactive Rocks
Central New England Province
Bradford, 6 mi. S of U.S. Highway 5: radioactivity of fine-grained gray gneiss exposed in 320-foot cliff in area mapped as Baker Pond gneiss, 0.003% eU: 842.
Thorium Occurrences
Jones Dark quarry in Williamstown: allanite present in "dark Barre" granite: 716.

VERMONT (contd.)

Orange County (contd.)
Thorium Occurrences
Topsham
Ricker quarry at W foot of Pine Mountain about 5½ mi. WSW of Blue Mountain: allanite, apatite, titanite, and zircon as accessory minerals in the "Pine Mountain" quartz monzonite granite: 717.
Woodsville quadrangle
Waits River formation: allanite as an accessory mineral, present in over 50% of the thin sections of the tonalite dikes and the leucocratic quartz monzonite dikes and in less than 50% of the thin sections of the granodiorite dikes: 1020.

Orleans County
Allanite Occurrences
Derby
Lacasse quarry about 4 mi. E of Newport: allanite as an accessory mineral in "Derby gray" granite: 716.
Newport Granite Co. quarry 4 mi. E of Newport on Lake Memphremagog: allanite, apatite, titanite, and rutile as accessory minerals in gray quartz monzonite granite: 717; allanite as an accessory in biotite granodiorite: 854.
Orthite Occurrences
Derby
Parameter quarry: only one grain of orthite found in biotite granodiorite: 854.
West side of exposures in old Salem township: orthite in leucogranodiorite: 854.

VERMONT (contd.)

Orleans County (contd.)
Thorium Occurrences
Derby
Lacasse quarry about 4 mi. E of Newport: allanite as an accessory mineral in "Derby gray" granite: 716.
Newport Granite Co. quarry 4 mi. E of Newport on Lake Memphremagog: allanite, apatite, titanite, and rutile as accessory minerals in gray quartz monzonite granite: 717; allanite as an accessory mineral in biotite granodiorite: 854.
Parameter quarry: only one grain of orthite found in biotite granodiorite: 854.
West side of exposures in old Salem township: orthite in leucogranodiorite: 854.

Orthite Occurrences
Vermont-Orthite Occurrences: See under individual county names and under Index III, Thorium Occurrences-Vermont: 854, 855, 918.

Prospectors' Guides
Vermont-Prospectors' Guides: See under individual county names and under Index III, Prospectors' Guides-Vermont: 1101.

Radioactive Rocks
Vermont-Radioactive Rocks: See under individual county names and under Index III, Radioactive Rocks-Vermont: 216, 724, 745, 1039.

Thorium Occurrences
Vermont-Thorium Occurrences: See under individual county names and under Index III, Thorium Occurrences-Vermont: 698, 716, 717, 719, 790, 791, 854, 855, 918, 1020, 1023, 1039.

VERMONT (contd.)

Uranium Exploration
Vermont-Uranium Exploration: See under individual county names and under Index III, Uranium Exploration-Vermont: 1101.

Uranium Occurrences
Vermont-Uranium Occurrences: See under individual county names and under Index III, Uranium Occurrences-Vermont: 27, 426, 443, 841, 1093, 1106.
Bibliography of U.S.G.S. reports: 572, 1004.

Washington County
Allanite Occurrences
Barre: allanite as an accessory in biotite granite: 790, 791.
Barre
General: Barre granite, known commercially as dark, medium, light, very dark, and white Barre, includes pyrite, magnetite, titanite, allanite, apatite, zircon, and rutile as accessory minerals: 717.
Duffee quarry SW of top of Millstone Hill: allanite, zircon, and probably magnetite and pyrite as accessory minerals in medium Barre, a biotite granite: 717; allanite as an accessory mineral in medium Barre granite: 716.
Cabot
Lambert's prospect on E side of a N-S ridge 4 mi. E of Robeson Mountain in Woodbury and 700 ft. above Woodbury pond on the Myron Goodnough farm near the Walden line: allanite, titanite, apatite, and pyrite as accessory minerals in a dark gray quartz monzonite granite: 717; allanite as an accessory mineral, of which one crystal was rimmed with epidote, in dark gray granite: 716.

VERMONT (contd.)

Washington County (contd.)
Thorium Occurrences
Barre: allanite as an accessory in biotite granite: 790, 791.
Barre
General: Barre granite, known commercially as dark, medium, light, very dark, and white Barre, includes pyrite, magnetite, titanite, allanite, apatite, zircon, and rutile, as accessory minerals: 717.
Duffee quarry SW of top of Millstone Hill: allanite as an accessory mineral in medium Barre granite: 716; allanite, zircon, and probably magnetite and pyrite as accessory minerals in medium Barre, a biotite granite: 717.
Cabot
Lambert's prospect on E side of a N-S ridge 4 mi. E of Robeson Mountain in Woodbury and 700 ft. above Woodbury Pond on the Myron Goodnough Farm near the Walden line: allanite, titanite, apatite, and pyrite as accessory minerals in a dark gray quartz/monzonite granite: 717; allanite as an accessory mineral, of which one crystal was rimmed with epidote, in dark gray granite: 716.

Windham County
Orthite Occurrences
Wellington Hill, 3 mi. N of Westminster and 2 mi. W of Connecticut River: small kernel of altered orthite in one epidote grain in biotite-tonalite outcrop: 855.

VERMONT (contd.)

Windham County (contd.)
Radioactive Rocks
Central New England Province
Brattleboro, on U.S. Highway 5 near Connecticut River, at two outcrops 5 and 8 mi. N of: radioactivity of phyllite in area mapped as Orfordville formation, 0.003-0.005% eU; 842.
Thorium Occurrences
Wellington Hill, 3 mi. N of Westminster and 2 mi. W of Connecticut River: small kernel of altered orthite in one epidote grain in biotite-tonalite outcrop: 855.

Windsor County
Allanite Occurrences
Mount Ascutney
Windsor
Mower quarry on W side of Mount Ascutney nearly 1¼ mi. S of Brownsville and 580 ft. above it in West Windsor: allanite, magnetite or ilmenite, among accessory minerals in "Windsor granite", the syenite, nordmarkite phase of R.A. Daly; joint faces show light rusty brown and cream-colored discoloration and in thin section some of the limonite stain clearly comes from magnetite or ilmenite, augite, and allanite particles: 717; allanite as an accessory mineral in "Windsor granite"; some limonite staining comes from allanite: 716.
Norcross quarry on N side of Mount Ascutney on the 1350-foot level about 950 ft. above Windsor and just over 1 mi. ESE of Brownsville: allanite, magnetite or ilmenite, and titanite as accessory minerals in "Windsor granite," the syenite, nordmarkite phase of R.A. Daly: 717; allanite as an

VERMONT (contd.)

Windsor County (contd.)
Allanite Occurrences
Mount Ascutney
Windsor
Norcross quarry on N side of Mount Ascutney on the 1350-foot level about 950 ft. above Windsor and just over 1 mi. ESE of Brownsville: accessory mineral in "Windsor granite" and in 4-foot granite dike crossing quarry: 716.
Quarry on flank of Mount Ascutney: allanite and monazite in nordmarkite or dark green syenite: 790.
Windsor quarry: allanite and monazite as accessory minerals found only in the nordmarkite phase (granitic habit) of the Main syenite stock, a handsome dark-green rock; allanite can be seen in hand specimens while monazite can only be recognized microscopically: 719.
Monazite Occurrences
Mount Ascutney
Windsor
Quarry on flank of Mount Ascutney: allanite and monazite in nordmarkite or dark green syenite: 790.
Windsor quarry: allanite and monazite as accessory minerals found only in the nordmarkite phase (granitic habit) of the Main syenite stock, a handsome dark-green rock; allanite can be seen in hand specimens while monazite can only be recognized microscopically: 719.

VERMONT (contd.)

Windsor County (contd.)
Orthite Occurrences
Chester, 2 mi. NE of: small amounts of orthite as an accessory in the leucotonalite outcrop owned and operated by the Gosselin Granite Company: 855.
West Windsor township on a hill 2 mi. SE of Felchville: orthite in syenite: 918.
Thorium Occurrences
Chester, 2 mi. NE of: small amounts of orthite as an accessory in the leucotonalite outcrop owned and operated by the Gosselin Granite Company: 855.
Mount Ascutney
Windsor
Mower quarry on W side of Mount Ascutney nearly 1 1/4 mi. S of Brownsville and 580 ft. above it in West Windsor: allanite as an accessory mineral in "Windsor granite"; some limonite staining comes from allanite: 716; allanite, magnetite or ilmenite, among accessory minerals in "Windsor granite", the syenite, nordmarkite phase of R.A. Daly; joint faces show light rusty brown and cream-colored discoloration and in thin section some of the limonite stain clearly comes from magnetite or ilmenite, augite, and allanite particles: 717.
Norcross quarry on N side of Mount Ascutney on the 1350-foot level about 950 feet above Windsor and just over 1 mi. ESE of Brownsville: allanite, magnetite or ilmenite, and titanite as accessory minerals in "Windsor granite", the syenite, nordmarkite phase of R.A. Daly: 717; allanite as an accessory mineral in "Windsor granite" and in 4-foot granite dike crossing quarry: 716.

VERMONT (contd.)

Windsor County (contd.)
Thorium Occurrences
Mount Ascutney
Windsor
Quarry on flank of Mount Ascutney: allanite and monazite in nordmarkite or dark green syenite: 790.
Windsor quarry: allanite and monazite as accessory minerals found only in the nordmarkite phase (granitic habit) of the Main syenite stock, a handsome dark-green rock; allanite can be seen in hand specimens while monazite can only be recognized microscopically: 719.
West Windsor township on a hill 2 mi. SE of Felchville: orthite in syenite: 918.

WISCONSIN

General
Geochemical Exploration
General
General: Wisconsin rivers, including the Mississippi River over 100 samples from 18 stations analyzed fluorimetrically for uranium and showed a uranium content of 0.01 to 1.1 (with an over-all average of 0.45) ppb, the experiments indicating an average error of ± 6.4% of the amount present: 630.
Mississippi River: at different seasons one station showed unsystematic variations in uranium content from 0.08 to 0.82 ppb and other large rivers showed similar variations: 630.
Northern Wisconsin small rivers: systematically show maximum uranium concentrations in winter and groundwater is believed to be responsible for most of the uranium in these streams: 630.
Southern Wisconsin rivers: systematically show maximum uranium concentrations in the spring and uranium from phosphate fertilizer is believed responsible for this springtime peak since analyses of such phosphate fertilizer last spring showed uranium content of 22 to 56 ppm. giving uranium concentrations of about 8 lbs. per sq. mi. of fertilized land: 630.
Methods: study of uranium content of river waters by sampling and noting seasonal variations; effect of use of uranium-bearing fertilizer on adjacent land on the uranium content of rivers: 630.
Utilization of data: information gained from studies useful in making tentative suggestions for a pattern of prospecting by geochemical methods based on sampling ground and surface waters: 630.

WISCONSIN (contd.)

General (contd.)
Prospectors' Guides
Exploration methods: 1092.
Geologic map: 1092.
Mining laws: 1092.
Mining methods: 1092.
Regulations regarding prospecting for uranium on federal land and national forests: 1092.
Regulations regarding prospecting for uranium on state-owned lands: 1092.
Uranium: 1092.
Pyrochlore Occurrences
General: pyrochlore: 883.
Radioactive Plants
General
Ashes from plant litter: 346 samples included litter from several type trees as well as that from prairies gave an average radioactivity of 3.6 alpha c.p.h./cm.^{2} and ranged from a minimum of 1.0 to a maximum of 10.2 alpha c.p.h./cm.^{2}: 885.
Soil below plant litter: 33 samples gave an average radioactivity of 2.2 alpha c.p.h./cm.^{2} with a minimum of 1.0 to a maximum of 6.8 alpha c.p.h./cm.^{2}: 885.
Radioactive Waters
General: 50 samples of underground and surface waters from northeastern part tested for radioactivity: 23 samples from deep wells ranged from 0.13 to 21.0 U ppm. in residue, and their waters ranged from 0.1 to 5.0 U ppb., 20 to 190 eU ppb., and 0.5 to 9% U/eU; 19 samples from wells of intermediate depth ranged from 0.1 to 10.0 U ppm. in residue, and their waters ranged from 0.05 to 4.6 U ppb., 1.5 to 90 eU ppb., and 1.0 to 50.0% U/eU; 7 samples from surface waters ranged from 1.1 to 16.0 U ppm. in residue, and their waters ranged from 0.4 to 3.0 U ppb., 0.75 to 6.0 eU ppb., and 27

WISCONSIN (contd.)

General (contd.)
Radioactive Waters
General:
to 50% U/eU; 1 deep well sample was omitted from the tabulations because the amount of residue recovered was so small that analytical results were not judged to be reliable; residue used was obtained by evaporation of water, and its radioactivity was measured in alpha counts per hour using scintillation counters: 796.
General
Well water residues: 41 samples studied gave an average radioactivity of 3.7 alpha c.p.h./cm.^{2} and ranged from a minimum of 0.1 to a maximum of 11.7 alpha c.p.h./cm.^{2}: 885.
Thorium Occurrences
General: pyrochlore: 883.
Gogebic Range: thorium-uranium ratio of Late Precambrian basaltic type rocks, 4.3; radioactivity of 0.40 x 10^{-6} g. U/g. rock and 1.72 x 10^{-6} g. Th/g. rock: 800.
Uranium Determinations
Fluorimetric Methods
General: Wisconsin rivers, including the Mississippi River, over 100 samples from 18 stations analyzed fluorimetrically for uranium and showed a uranium content of 0.01 to 1.1 (with an over-all average of 0.45) ppb, the experiments indicating an average error of $\mp$ 6.4% of the amount present: 630.
Uranium Exploration
General: U.S.A.E.C. opens field office in Ishpeming, Michigan, to assist prospectors in uranium exploration work in Minnesota, Michigan, and Wisconsin: 1074.

WISCONSIN (contd.)

General (contd.)
Uranium Exploration
Geochemical Exploration
General
General: Wisconsin rivers, including the Mississippi River, over 100 samples from 18 stations analyzed fluorimetrically for uranium and showed a uranium content of 0.01 to 1.1 (with an over-all average of 0.45) ppb., the experiments indicating an average error of ± 6.4% of the amount present: 630.
Mississippi River: at different seasons one station showed unsystematic variations in uranium content from 0.08 to 0.82 ppb. and other large rivers showed similar variations: 630.
Northern Wisconsin small rivers: systematically show maximum uranium concentrations in winter and ground water is believed to be responsible for most of the uranium in these streams: 630.
Southern Wisconsin rivers: systematically show maximum uranium concentrations in the spring and uranium from phosphate fertilizer is believed responsible for this springtime peak since analyses of such phosphate fertilizer last spring showed uranium content of 22 to 56 ppm. giving uranium concentrations of about 8 lbs. per sq. mi. of fertilized land: 630.

WISCONSIN (contd.)

General (contd.)
Uranium Exploration
Geochemical Exploration
Methods: study of uranium content of river waters by sampling and noting seasonal variations; effect of use of uranium-bearing fertilizer on adjacent land on the uranium content of rivers: 630.
Utilization of data: information gained from studies useful in making tentative suggestions for a pattern of prospecting by geochemical methods based on sampling ground and surface waters: 630.
Geologic map: 1092.
Methods: 1092.
Mining laws: 1092.
Mining methods: 1092.
Prospectors' guide: 1092.
Regulations regarding prospecting for uranium on federal land and national forests: 1092.
Regulations regarding prospecting for uranium on state-owned land: 1092.
Uranium Occurrences
General: Wisconsin rivers, including the Mississippi River, over 100 samples from 18 stations analyzed fluorimetrically for uranium and showed a uranium content of 0.01 to 1.1 (with an over-all average of 0.45) ppb., the experiments indicating an average error of ± 6.4% of the amount present: 630; 50 samples of underground and surface waters from northeastern part tested for radioactivity; 23 samples from deep wells ranged from 0.13 to 21.0 U ppm. in residue, and their waters range from 0.1 to 5.0 U ppb., 20 to 190 eU ppb., and 0.5 to 9% U/eU; 19 samples from wells of intermediate depth range from 0.1 to 10.0 U ppm. in residue, and their waters ranged from 0.05 to 4.6 U ppb., 1.5 to 90 eU ppb.,

WISCONSIN (contd.)

General (contd.)
Uranium Occurrences
General:
and 1.0 to 50.0% U/eU; 7 samples from surface waters ranged from 1.1 to 16.0 U ppm. in residue, and their waters ranged from 0.4 to 3.0 U ppb., 0.75 to 6.0 eU ppb., and 27 to 50% U/eU; 1 deep well sample was omitted from the tabulations because the amount of residue recovered was so small that analytical results were not judged to be reliable; residue used was obtained by evaporation of water, and its radioactivity was measured in alpha counts per hour using scintillation counters: 796; pyrochlore: 883; there have been no authenticated occurrences of uranium which might indicate the presence of commercial mineralization although scatterings of uranium-bearing minerals in granitic rocks are common: 1092; potential sources of uranium which should be investigated further are the Precambrian granitic and metamorphic rocks, which are similar in nature and geologic age to the rocks carrying the Canadian uranium deposits and include pre-Keweenawan, Keweenawan, and quartzite rocks: 1092.
Gogebic Range: thorium-bearing ratio of Late Precambrian basaltic type rocks, 4.3; radioactivity of 0.40 x 10^{-6} g. U/g. rock and 1.72 x 10^{-6} g. Th/g. rock: 800.
Mississippi River: at different seasons one station showed unsystematic variations in uranium content from 0.08 to 0.82 ppb. and other large rivers showed similar variations: 630.

WISCONSIN (contd.)

General (contd.)
Uranium Occurrences
Northern Wisconsin small rivers: systematically show maximum uranium concentrations in winter and ground water is believed to be responsible for most of the uranium in these streams: 630.
Southern Wisconsin rivers: systematically show maximum uranium concentrations in the spring and uranium from phosphate fertilizer is believed responsible for this springtime peak since analyses of such phosphate fertilizer last spring showed uranium content of 22 to 56 ppm. giving uranium concentrations of about 8 lbs. per sq. mi. of fertilized land: 630.
Water, Uranium-bearing
General: Wisconsin rivers, including the Mississippi River, over 100 samples from 18 stations analyzed fluorimetrically for uranium and showed a uranium content of 0.01 to 1.1 (with an over-all average of 0.45) ppb., the experiments indicating an average error of ± 6.4% of the amount present: 630; 50 samples of underground and surface waters from northeastern part tested for radioactivity: 23 samples from deep wells ranged from 0.13 to 21.0 U ppm. in residue, and their waters range from 0.1 to 5.0 U ppb., 20 to 190 eU ppb., and 0.5 to 9% U/eU; 19 samples from wells of intermediate depth ranged from 0.1 to 10.0 U ppm. in residue, and their waters ranged from 0.05 to 4.6 U ppb., 1.5 to 90 eU ppb., and 1.0 to 50.0% U/eU; 7 samples from surface waters ranged from 1.1 to 16.0 U ppm. in residue, and their waters ranged from 0.4 to 3.0 U ppb., 0.75 to 6.0 eU ppb., and 27 to 50% U/eU; 1 deep well

WISCONSIN (contd.)

General (contd.)
Uranium Occurrences
Waters, Uranium-bearing
General:
sample was omitted from the tabulations because the amount of residue recovered was so small that analytical results were not judged to be reliable; residue used was obtained by evaporation of water, and its radioactivity was measured in alpha counts per hour using scintillation counters: 796.
Mississippi River: at different seasons one station showed unsystematic variations in uranium content from 0.08 to 0.82 ppb. and other large rivers showed similar variations: 630.
Northern Wisconsin small rivers: systematically show maximum uranium concentrations in winter and ground water is believed to be responsible for most of the uranium in these streams: 630.
Southern Wisconsin rivers: systematically show maximum uranium concentrations in the spring and uranium from phosphate fertilizer is believed responsible for this springtime peak since analyses of such phosphate fertilizer last spring showed uranium content of 22 to 56 ppm. giving uranium concentrations of about 8 lbs. per sq. mi. of fertilized land: 630.

WISCONSIN (contd.)

General (contd.)
Waters, Uranium-bearing
General: Wisconsin rivers, including Mississippi River over 100 samples from 18 stations analyzed fluorimetrically for uranium and showed a uranium content of 0.01 to 1.1 (with an over-all average of 0.45) ppb, the experiments indicating an average error of ± 6.4% of the amount present: 630; 50 samples of underground and surface waters from northeastern part tested for radioactivity; 23 samples from deep wells ranged from 0.13 to 21.0 U ppm. in residue, and their waters ranged from 0.1 to 5.0 U ppb., 20 to 190 eU ppb., and 0.5 to 9% U/eU; 19 samples from wells of intermediate depth ranged from 0.1 to 10.0 U ppm. in residue, and their waters ranged from 0.05 to 4.6 U ppb., 1.5 to 90 eU ppb., and 1.0 to 50.0% U/eU; 7 samples from surface waters ranged from 1.1 to 16.0 U ppm. in residue, and their waters ranged from 0.4 to 3.0 U ppb., 0.75 to 6.0 eU ppb., and 27 to 50% U/eU; 1 deep well sample was omitted from the tabulations because the amount of residue recovered was so small that analytical results were not judged to be reliable; residue used was obtained by evaporation of water, and its radioactivity was measured in alpha counts per hour using scintillation counters: 796.
Mississippi River: at different seasons one station showed unsystematic variations in uranium content from 0.08 to 0.82 ppb. and other large rivers showed similar variations: 630.

WISCONSIN (contd.)

General (contd.)
Waters, Uranium-bearing
Northern Wisconsin small rivers: systematically show maximum uranium concentrations in winter and groundwater is believed to be responsible for most of the uranium in these streams: 630.
Southern Wisconsin rivers: systematically show maximum uranium concentrations in the spring and uranium from phosphate fertilizer is believed responsible for this springtime peak since analyses of such phosphate fertilizer last spring showed uranium content of 22 to 56 ppm. giving uranium concentrations of about 8 lbs. per sq. mi. of fertilized land: 630.

Allanite Occurrences
Wisconsin-Allanite Occurrences: See under individual county names and under Index III, Thorium Occurrences-Wisconsin: 743.

Brown County
Radioactive Waters
De Pere
Armour & Co. well: deep well: aquifer, Cambrian sandstone; Sample No. 10-18-1, residue showed 1.5 U ppm. and 162 alpha c.p.h. for 6 mos., and water showed 0.4 U ppb., 76 eU ppb., and 0.5% U/eU: 796.
East Bank Well: deep well: aquifer, Cambrian sandstone; Sample No. 10-17-1, residue showed 1.2 U ppm. and 126 alpha c.p.h. for 6 mos., and water showed 0.3 U ppb., 71 eU ppb., and 0.5% U/eU: 796.

WISCONSIN (contd.)

Brown County (contd.)
Radioactive Waters
De Pere
Harry Liebergen well: well of intermediate depth: aquifer, Ordovician limestone; Sample No. 10-37-1, residue showed 0.4 U ppm. and 6 alpha c.p.h. for 6 mos., and water showed 0.1 U ppb., 2.5 eU ppb., and 4% U/eU: 796.
Denmark
Chicago and Northwestern RR. Depot well: well of intermediate depth: aquifer, Ordovician sandstone; Sample No. 10-4-1, residue showed 4.3 U ppm. and 4 alpha c.p.h. for 6 mos., and water showed 4.6 U ppb., 9 eU ppb., and 50% U/eU: 796.
Green Bay
Ashwaubenon Sanitary District well: deep well: aquifer, Cambrian sandstone; Sample No. 10-19-1, residue showed 2.1 U ppm. and 151 alpha c.p.h. for 6 mos., and water showed 0.5 U ppb., 72 eU ppb., and 0.5% U/eU: 796.
Boland Road well: deep well: aquifer, Cambrian sandstone; Sample No. 10-21-1, residue showed 4.2 U ppm. and 192 alpha c.p.h. for 6 mos., and water showed 1.1 U ppb., 50 eU ppb., and 2.0% U/eU: 796.
Clarence Greatens well: well of intermediate depth: aquifer, glacial drift; Sample No. 10-40-1, residue showed 0.1 U ppm. and 3 alpha c.p.h. for 6 mos., and water showed 0.05 U ppb., 2.5 eU ppb., and 2% U/eU: 796.
Fox River: surface water: Sample No. 10-41-1, residue showed 2.9 U ppm. and 5 alpha c.p.h. for 6 mos., and water showed 0.5 U ppb., 1.5 eU ppb., and 33% U/eU: 796.

WISCONSIN (contd.)

Brown County (contd.)
Radioactive Waters
Green Bay
Gray Street well: deep well: aquifer, Cambrian sandstone; Sample No. 10-20-1, residue showed 0.8 U ppm. and 118 alpha c.p.h. for 6 mos., and water showed 0.2 U ppb., 61 eU ppb., and 0.5% U/eU: 796.
Northern Paper Mills well: deep well: aquifer, Cambrian sandstone; Sample No. 10-24-1, residue showed 1.7 U ppm., and 143 alpha c.p.h. for 6 mos., and water showed 0.7 U ppb., 110 eU ppb., and 0.5% U/eU: 796.
Little Rapids
Brown County Sanitarium well: well of intermediate depth: aquifer, Ordovician sandstone; Sample No. 10-16-1, residue showed 0.5 U ppm. and 18 alpha c.p.h. for 6 mos., and water showed 0.2 U ppb., 14 eU ppb., and 1.5% U/eU: 796.
Roy Wellmer well: well of intermediate depth: aquifer, Ordovician limestone; Sample No. 10-38-1, residue showed 0.8 U ppm. and 6 alpha c.p.h. for 6 mos., and water showed 0.3 U ppb., 5 eU ppb., and 6% U/eU: 796.
Mills Center
Walter Kimbs well: well of intermediate depth: aquifer, Ordovician sandstone; Sample No. 10-12-1, residue showed 0.3 U ppm. and 6 alpha c.p.h. for 6 mos., and water showed 0.3 U ppb., 1.5 eU ppb., and 2% U/eU: 796.

WISCONSIN (contd.)

Brown County (contd.)
Radioactive Waters
Point Sauble (Sable)
Village Well: deep well: aquifer, Cambrian sandstone; Sample No. 10-8-1, residue showed 0.13 U ppm. and 108 alpha c.p.h. for 6 mos., and water showed 0.1 U ppb., 140 eU ppb., and no % U/eU: 796.
Preble
Deckner Avenue Well: deep well: aquifer, Cambrian sandstone; Sample No. 10-22-1, residue showed 2.4 U ppm. and 126 alpha c.p.h. for 6 mos., and water showed 0.9 U ppb., 89 eU ppb., and 1% U/eU: 796.
Town Well No. 2: deep well: aquifer, Cambrian sandstone; Sample No. 10-23-1, residue showed 1.7 U ppm. and 130 alpha c.p.h. for 6 mos., and water showed 1.2 U ppb., 190 eU ppb., and 0.5% U/eU: 796.
Pulaski
City Well: deep well: aquifer, Cambrian sandstone; Sample No. 10-9-1, residue showed 1.2 U ppm. and 67 alpha c.p.h. for 6 mos., and water showed 0.3 U ppb., 32 eU ppb., and 1% U/eU: 796.
Shirley
George Treml well: well of intermediate depth: aquifer, Silurian limestone; Sample No. 10-39-1, residue showed 1.5 U ppm. and 16 alpha c.p.h. for 6 mos., and water showed 1.6 U ppb., 33 eU ppb., and 5% U/eU: 796.

WISCONSIN (contd.)

Brown County (contd.)
Radioactive Waters
Suamico
Carl Jenkins well: well of intermediate depth: aquifer, Ordovician sandstone; Sample No. 10-11-1, residue showed 9.0 U ppm. and 42 alpha c.p.h. for 6 mos., and water showed 2.0 U ppb., 18 eU ppb., and 11% U/eU: 796.
Suamico Dairy well: deep well; aquifer, Cambrian sandstone; Sample No. 10-10-1, residue showed 21.0 U ppm. and 93 alpha c.p.h. for 6 mos., and water showed 5.0 U ppb., 44 eU ppb., and 9% U/eU: 796.
Wrightstown
Fox River Dairy well: deep well; aquifer, Cambrian sandstone; Sample No. 10-3-1, residue showed 1.0 U ppm. and 9 alpha c.p.h. for 6 mos., and water showed 1.1 U ppb., 20 eU ppb., and 5% U/eU: 796.
Uranium Occurrences
Waters, Uranium-bearing
De Pere
Armour & Co. well: deep well: aquifer, Cambrian sandstone; Sample No. 10-18-1, residue showed 1.5 U ppm. and 162 alpha c.p.h. for 6 mos., and water showed 0.4 U ppb. 76 eU ppb., and 0.5% U/eU: 796.
East Bank Well: deep well: aquifer, Cambrian sandstone; Sample No. 10-17-1, residue showed 1.2 U ppm. and 126 alpha c.p.h. for 6 mos., and water showed 0.3 U ppb., 71 eU ppb., and 0.5% U/eU: 796.

WISCONSIN (contd.)

Brown County (contd.)
Uranium Occurrences
Waters, Uranium-bearing
De Pere
Harry Liebergen well: well of intermediate depth: aquifer, Ordovician limestone; Sample No. 10-37-1, residue showed 0.4 U ppm. and 6 alpha c.p.h. for 6 mos., and water showed 0.1 U ppb., 2.5 eU ppb., and 4% U/eU: 796.
Denmark
Chicago and Northwestern RR. Depot well: well of intermediate depth: aquifer, Ordovician sandstone; Sample No. 10-4-1, residue showed 4.3 U ppm. and 4 alpha c.p.h. for 6 mos., and water showed 4.6 U ppb., 9 eU ppb., and 50% U/eU: 796.
Green Bay
Ashwaubenon Sanitary District Well: deep well: aquifer, Cambrian sandstone; Sample No. 10-19-1, residue showed 2.1 U ppm. and 151 alpha c.p.h. for 6 mos., and water showed 0.5 U ppb., 72 eU ppb., and 0.5% U/eU: 796.
Boland Road well: deep well: aquifer, Cambrian sandstone; Sample No. 10-21-1, residue showed 4.2 U ppm. and 192 alpha c.p.h. for 6 mos., and water showed 1.1 U ppb., 50 eU ppb., and 2.0% U/eU: 796.
Clarence Greatens well: well of intermediate depth: aquifer, glacial drift; Sample No. 10-40-1, residue showed 0.1 U ppm. and 3 alpha c.p.h. for 6 mos., and water showed 0.05 U ppb., 2.5 eU ppb., and 2% U/eU: 796.

WISCONSIN (contd.)

Brown County (contd.)
Uranium Occurrences
Waters, Uranium-bearing
Green Bay
Fox River: surface water: Sample No. 10-41-1, residue showed 2.9 U ppm. and 5 alpha c.p.h. for 6 mos., and water showed 0.5 U ppb, 1.5 eU ppb, and 33% U/eU: 796.
Gray Street well: deep well: aquifer, Cambrian sandstone; Sample No. 10-20-1, residue showed 0.8 U ppm. and 118 alpha c.p.h. for 6 mos., and water showed 0.2 U ppb, 61 eU ppb, and 0.5% U/eU: 796.
Northern Paper Mills well: deep well: aquifer, Cambrian sandstone; Sample No. 10-24-1, residue showed 1.7 U ppm. and 143 alpha c.p.h. for 6 mos., and water showed 0.7 U ppb, 110 eU ppb, and 0.5% U/eU: 796.
Little Rapids
Brown County Sanitarium well: well of intermediate depth: aquifer, Ordovician sandstone; Sample No. 10-16-1, residue showed 0.5 U ppm. and 18 alpha c.p.h. for 6 mos., and water showed 0.2 U ppb, 14 eU ppb, and 1.5% U/eU: 796.
Roy Wellmer well: well of intermediate depth: aquifer, Ordovician limestone; Sample No. 10-38-1, residue showed 0.8 U ppm. and 6 alpha c.p.h. for 6 mos., and water showed 0.3 U ppb, 5 eU ppb, and 6% U/eU: 796.

WISCONSIN (contd.)

Brown County (contd.)
Uranium Occurrences
Waters, Uranium-bearing
Mills Center
Walter Kimbs well: well of intermediate depth: aquifer, Ordovician sandstone; Sample No. 10-12-1, residue showed 0.3 U ppm. and 6 alpha c.p.h. for 6 mos., and water showed 0.3 U ppb, 1.5 eU ppb, and 2% U/eU: 796.
Point Sauble (Sable)
Village well: deep well: aquifer, Cambrian sandstone; Sample No. 10-8-1, residue showed 0.13 U ppm. and 108 alpha c.p.h. for 6 mos., and water showed 0.1 U ppb, 140 eU ppb, and no % U/eU: 796.
Preble
Deckner Avenue well: deep well: aquifer, Cambrian sandstone; Sample No. 10-22-1, residue showed 2.4 U ppm. and 126 alpha c.p.h. for 6 mos., and water showed 0.9 U ppb, 89 eU ppb, and 1% U/eU: 796.
Town well No. 2: deep well: aquifer, Cambrian sandstone; Sample No. 10-23-1, residue showed 1.7 U ppm. and 130 alpha c.p.h. for 6 mos., and water showed 1.2 U ppb, 190 eU ppb, and 0.5% U/eU: 796.
Pulaski
City well: deep well: aquifer, Cambrian sandstone; Sample No. 10-9-1, residue showed 1.2 U ppm. and 67 alpha c.p.h. for 6 mos., and water showed 0.3 U ppb, 32 eU ppb, and 1% U/eU: 796.

WISCONSIN (contd.)

Brown County (contd.)
Uranium Occurrences
Waters, Uranium-bearing
Shirley
George Treml well: well of intermediate depth: aquifer, Silurian limestone; Sample No. 10-39-1, residue showed 1.5 U ppm. and 16 alpha c.p.h. for 6 mos., and water showed 1.6 U ppb, 33 eU ppb, and 5% U/eU: 796.
Suamico
Carl Jenkins well: well of intermediate depth: aquifer, Ordovician sandstone; Sample No. 10-11-1, residue showed 9.0 U ppm. and 42 alpha c.p.h. for 6 mos., and water showed 2.0 U ppb, 18 eU ppb, and 11% U/eU: 796.
Suamico Dairy well: deep well: aquifer, Cambrian sandstone; Sample No. 10-10-1, residue showed 21.0 U ppm. and 93 alpha c.p.h. for 6 mos., and water showed 5.0 U ppb, 44 eU ppb, and 9% U/eU: 796.
Wrightstown
Fox River Dairy well: deep well: aquifer, Cambrian sandstone; Sample No. 10-3-1, residue showed 1.0 U ppm. and 9 alpha c.p.h. for 6 mos., and water showed 1.1 U ppb, 20 eU ppb, and 5% U/eU: 796.
Waters, Uranium-bearing
De Pere
Armour & Co. well: deep well: aquifer, Cambrian sandstone; Sample No. 10-18-1, residue showed 1.5 U ppm. and 162 alpha c.p.h. for 6 mos., and water showed 0.4 U ppb, 76 eU ppb, and 0.5% U/eU: 796.

WISCONSIN (contd.)

Brown County (contd.)
Waters, Uranium-bearing
De Pere
East Bank well: deep well: aquifer, Cambrian sandstone: Sample No. 10-17-1, residue showed 1.2 U ppm. and 126 alpha c.p.h. for 6 mos., and water showed 0.3 U ppb, 71 eU ppb, and 0.5% U/eU: 796.
Harry Liebergen well: well of intermediate depth: aquifer, Ordovician limestone; Sample No. 10-37-1, residue showed 0.4 U ppm. and 6 alpha c.p.h. for 6 mos., and water showed 0.1 U ppb, 2.5 eU ppb, and 4% U/eU: 796.
Denmark
Chicago and Northwestern RR. Depot well: well of intermediate depth: aquifer, Ordovician sandstone; Sample No. 10-4-1, residue showed 4.3 U ppm. and 4 alpha c.p.h. for 6 mos., and water showed 4.6 U ppb, 9 eU ppb, and 50% U/eU: 796.
Green Bay
Ashwaubenon Sanitary District well: deep well: aquifer, Cambrian sandstone; Sample No. 10-19-1, residue showed 2.1 U ppm. and 151 alpha c.p.h. for 6 mos., and water showed 0.5 U ppb, 72 eU ppb, and 0.5% U/eU: 796.
Boland Road well: deep well: aquifer, Cambrian sandstone; Sample No. 10-21-1, residue showed 4.2 U ppm. and 192 alpha c.p.h. for 6 mos., and water showed 1.1 U ppb, 50 eU ppb, and 2.0% U/eU: 796.

WISCONSIN (contd.)

Brown County (contd.)
Waters, Uranium-bearing
Green Bay
Clarence Greatens well: well of intermediate depth: aquifer, glacial drift; Sample No. 10-40-1, residue showed 0.1 U ppm. and 3 alpha c.p.h. for 6 mos., and water showed 0.05 U ppb., 2.5 eU ppb., and 2% U/eU: 796.
Fox River: surface water: Sample No. 10-41-1, residue showed 2.9 U ppm. and 5 alpha c.p.h. for 6 mos., and water showed 0.5 U ppb., 1.5 eU ppb., and 33% U/eU: 796.
Gray Street well: deep well: aquifer, Cambrian sandstone; Sample No. 10-20-1, residue showed 0.8 U ppm. and 118 alpha c.p.h. for 6 mos., and water showed 0.2 U ppb., 61 eU ppb., and 0.5% U/eU: 796.
Northern Paper Mills well: deep well: aquifer, Cambrian sandstone; Sample No. 10-24-1, residue showed 1.7 U ppm. and 143 alpha c.p.h. for 6 mos., and water showed 0.7 U ppb., 110 eU ppb., and 0.5% U/eU: 796.
Little Rapids
Brown County Sanitarium well: well of intermediate depth: aquifer, Ordovician sandstone; Sample No. 10-16-1, residue showed 0.5 U ppm. and 18 alpha c.p.h. for 6 mos., and water showed 0.2 U ppb., 14 eU ppb., and 1.5% U/eU: 796.

WISCONSIN (contd.)

Brown County (contd.)
Waters, Uranium-bearing
Little Rapids
Roy Wellmer well: well of intermediate depth: aquifer, Ordovician limestone; Sample No. 10-38-1, residue showed 0.8 U ppm. and 6 alpha c.p.h. for 6 mos., and water showed 0.3 U ppb., 5 eU ppb., and 6% U/eU: 796.
Mills Center
Walter Kimbs well: well of intermediate depth: aquifer, Ordovician sandstone; Sample No. 10-12-1, residue showed 0.3 U ppm. and 6 alpha c.p.h. for 6 mos., and water showed 0.3 U ppb., 1.5 eU ppb., and 2% U/eU: 796.
Point Sauble (Sable)
Village well: deep well: aquifer, Cambrian sandstone; Sample No. 10-8-1, residue showed 0.13 U ppm. and 108 alpha c.p.h. for 6 mos., and water showed 0.1 U ppb., 140 eU ppb., and no % U/eU: 796.
Preble
Deckner Avenue well: deep well: aquifer, Cambrian sandstone; Sample No. 10-22-1, residue showed 2.4 U ppm. and 126 alpha c.p.h. for 6 mos., and water showed 0.9 U ppb., 89 eU ppb., and 1% U/eU: 796.
Town well No. 2: deep well: aquifer, Cambrian sandstone; Sample No. 10-23-1, residue showed 1.7 U ppm. and 130 alpha c.p.h. for 6 mos., and water showed 1.2 U ppb., 190 eU ppb., and 0.5% U/eU: 796.

WISCONSIN (contd.)

Brown County (contd.)
Waters, Uranium-bearing
Pulaski
City well: deep well: aquifer, Cambrian sandstone; Sample No. 10-9-1, residue showed 1.2 U ppm. and 67 alpha c.p.h. for 6 mos., and water showed 0.3 U ppb., 32 eU ppb., and 1% U/eU: 796.
Shirley
George Treml well: well of intermediate depth: aquifer, Silurian limestone; Sample No. 10-39-1, residue showed 1.5 U ppm. and 16 alpha c.p.h. for 6 mos., and water showed 1.6 U ppb., 33 eU ppb., and 5% U/eU: 796.
Suamico
Carl Jenkins well: well of intermediate depth; aquifer, Ordovician sandstone; Sample No. 10-11-1, residue showed 9.0 U ppm. and 42 alpha c.p.h. for 6 mos., and water showed 2.0 U ppb., 18 eU ppb., and 11% U/eU: 796.
Suamico Dairy well: deep well: aquifer, Cambrian sandstone; Sample No. 10-10-1, residue showed 21.0 U ppm. and 93 alpha c.p.h. for 6 mos., and water showed 5.0 U ppb., 44 eU ppb., and 9% U/eU: 796.
Wrightstown
Fox River Dairy well: deep well: aquifer, Cambrian sandstone; Sample No. 10-3-1, residue showed 1.0 U ppm. and 9 alpha c.p.h. for 6 mos., and water showed 1.1 U ppb., 20 eU ppb., and 5% U/eU: 796.

WISCONSIN (contd.)

Calumet County
Radioactive Waters
Brillion
City well: well of intermediate depth: aquifer, Ordovician sandstone; Sample No. 10-5-1, residue showed 1.8 U ppm. and 10 alpha c.p.h. for 6 mos., and water showed 0.5 U ppb., 6 eU ppb., and 8% U/eU: 796.
Uranium Occurrences
Waters, Uranium-bearing
Brillion
City well: well of intermediate depth: aquifer, Ordovician sandstone; Sample No. 10-5-1, residue showed 1.8 U ppm. and 10 alpha c.p.h. for 6 mos., and water showed 0.5 U ppb., 6 eU ppb., and 8% U/eU: 796.
Waters, Uranium-bearing
Brillion
City well: well of intermediate depth: aquifer, Ordovician sandstone; Sample No. 10-5-1, residue showed 1.8 U ppm. and 10 alpha c.p.h. for 6 mos., and water showed 0.5 U ppb., 6 eU ppb., and 8% U/eU: 796.

Dane County
Radioactive Waters
Madison
Lake Mendota: surface water: Sample No. 10-49-1, residue showed 1.1 U ppm. and 1 alpha c.p.h. for one month, and water showed 0.4 U ppb., 0.75 eU ppb., and 50% U/eU: 796.
Unnamed well: deep well: aquifer, Cambrian sandstone; residue was too small for analytical results to be judged to be reliable and no figures were included for this well in the tabulations; residue did serve as an excellent example of decreasing radioactivity in terms of alpha counts per hour since counts were taken on samples repeatedly during the

WISCONSIN (contd.)

Dane County (contd.)
Radioactive Waters
Madison
Unnamed well:
three-week period immediately after evaporation of the water and the activity decreased by one-half during this interval: 796.
Uranium Occurrences
Waters, Uranium-bearing
Madison
Lake Mendota: surface water; Sample No. 10-49-1, residue showed 1.1 U ppm. and 1 alpha c.p.h. for one month, and water showed 0.4 U ppb, 0.75 eU ppb, and 50% U/eU: 796.
Unnamed well: deep well: aquifer, Cambrian sandstone; residue was too small for analytical results to be judged to be reliable and no figures were included for this well in the tabulations; residue did serve as an excellent example of decreasing radioactivity in terms of alpha counts per hour since counts were taken on samples repeatedly during the three-week period immediately after evaporation of water and the activity decreased by one-half during this interval: 796.
Waters, Uranium-bearing
Madison
Lake Mendota: surface water: Sample No. 10-49-1, residue showed 1.1 U ppm. and 1 alpha c.p.h. for one month, and water showed 0.4 U ppb, 0.75 eU ppb, and 50% U/eU: 796.

WISCONSIN (contd.)

Dane County (contd.)
Waters, Uranium-bearing
Madison
Unnamed well: deep well: aquifer, Cambrian sandstone; residue was too small for analytical results to be judged to be reliable and no figures were included for this well in the tabulations; residue did serve as an excellent example of decreasing radioactivity in terms of alpha counts per hour since counts were taken on sample repeatedly during the three-week period immediately after evaporation of the water and the activity decreased by one-half during this interval: 796.

Door County
Radioactive Waters
Algoma
City well No. 2: well of intermediate depth: aquifer, Ordovician sandstone; Sample No. 10-6-1, residue showed 2.4 U ppm. and 41 alpha c.p.h. for 6 mos., and water showed 1.2 U ppb, 41 eU ppb, and 3% U/eU: 796.
Louis Manly well: well of intermediate depth: aquifer, Silurian limestone; Sample No. 10-35-1, residue showed 1.5 U ppm. and 6 alpha c.p.h. for 6 mos., and water showed 0.5 U ppb, 4 eU ppb, and 13% U/eU: 796.
Casco Junction
Green Bay and Western RR. Well: well of intermediate depth: aquifer, Silurian limestone, Sample No. 10-7-1, residue showed 4.6 U ppm. and 35 alpha c.p.h. for 6 mos., and water showed 1.6 U ppb, 24 eU ppb, and 6% U/eU: 796.

WISCONSIN (contd.)

Door County (contd.)
Radioactive Waters
Dykesville
John Collin well: well of intermediate depth: aquifer, Silurian limestone; Sample No. 10-36-1, residue showed 1.5 U ppm. and 7 alpha c.p.h. for 6 mos., and water showed 0.4 U ppb, 3.5 eU ppb, and 11% U/eU: 796.
Uranium Occurrences
Waters, Uranium-bearing
Algoma
City well No. 2: well of intermediate depth: aquifer, Ordovician sandstone; Sample No. 10-6-1, residue showed 2.4 U ppm. and 41 alpha c.p.h. for 6 mos., and water showed 1.2 U ppb, 41 eU ppb, and 3% U/eU: 796.
Louis Manly well: well of intermediate depth: aquifer, Silurian limestone; Sample No. 10-35-1, residue showed 1.5 U ppm. and 6 alpha c.p.h. for 6 mos., and water showed 0.5 U ppb, 4 eU ppb, and 13% U/eU: 796.
Casco Junction
Green Bay and Western RR. well: well of intermediate depth: aquifer, Silurian limestone; Sample No. 10-7-1, residue showed 4.6 U ppm. and 35 alpha c.p.h. for 6 mos., and water showed 1.6 U ppb, 24 eU ppb, and 6% U/eU: 796.
Dykesville
John Collin well: well of intermediate depth: aquifer, Silurian limestone; Sample No. 10-36-1, residue showed 1.5 U ppm. and 7 alpha c.p.h. for 6 mos., and water showed 0.4 U ppb, 3.5 eU ppb, and 11% U/eU: 796.

WISCONSIN (contd.)

Door County (contd.)
Waters, Uranium-bearing
Algoma
City well No. 2: well of intermediate depth: aquifer, Ordovician sandstone; Sample No. 10-6-1, residue showed 2.4 U ppm. and 41 alpha c.p.h. for 6 mos., and water showed 1.2 U ppb, 41 eU ppb, and 3% U/eU: 796.
Louis Manly well: well of intermediate depth: aquifer, Silurian limestone; Sample No. 10-35-1, residue showed 1.5 U ppm. and 6 alpha c.p.h. for 6 mos., and water showed 0.5 U ppb, 4 eU ppb, and 13% U/eU: 796.
Casco Junction
Green Bay and Western RR well: well of intermediate depth: aquifer, Silurian limestone; Sample No. 10-7-1, residue showed 4.6 U ppm. and 35 alpha c.p.h. for 6 mos., and water showed 1.6 U ppb, 24 eU ppb, and 6% U/eU: 796.
Dykesville
John Collin well: well of intermediate depth: aquifer, Silurian limestone; Sample No. 10-36-1, residue showed 1.5 U ppm. and 7 alpha c.p.h. for 6 mos., and water showed 0.4 U ppb, 3.5 eU ppb, and 11% U/eU: 796.

Geochemical Exploration
Wisconsin-Geochemical Exploration: See under individual county names and under Index III, Geochemical Exploration-Wisconsin: 630.

Geophysical Exploration (Airborne)
Wisconsin-Geophysical Exploration (Airborne): See under individual county names and under Index III, Geophysical Exploration (Airborne)-Wisconsin: 996, 1092, 1115.

WISCONSIN (contd.)

Geophysical Exploration (Ground)

Wisconsin-Geophysical Exploration (Ground): See under individual county names and under Index III, Geophysical Exploration (Ground)-Wisconsin: 996, 1115.

Hematite, Thorium-bearing

Wisconsin-Hematite, Thorium-bearing: See under individual county names and under Index III, Hematite, Thorium-bearing-Wisconsin: 995.

Marathon County

Allanite Occurrences

Wausau: airborne and ground reconnaissance of part of the syenite complex of Precambrian age revealed 12 radioactive mineral localities: 1115; except for one locality, there are no outcrops in the immediate vicinity of the radioactivity anomalies and the radioactivity seems to be due mainly to residual accumulations of radioactive minerals in soil or radioactive minerals occurring in float; shallow trenching at two of the largest anomalies showed that the radioactive material extended down into the weathered bedrock but the source of radioactive float at three localities was not determined: 1115; earlier geologic investigations had reported the presence of marignacite, a form of pyrochlore, in the area, as well as allanite or piedmontite at the rapids in the Wisconsin River at Wausau: 1115; present studies of Secs. 9-28, T. 29 N., R. 6 E., by airborne scintillation survey meter and ground reconnaissance methods showed: allanite at one locality in Sec. 15 in the syenite complex; thorogummite at two localities in Sec. 27 and

WISCONSIN (contd.)

Marathon County (contd.)

Allanite Occurrences

Wausau:

two in Sec. 28, the latter in areas of radioactivity anomalies, all outside the syenite complex; thorium-bearing zircon at one locality in Sec. 15, one in Sec. 22, and two in Sec. 23, all in pegmatites in the syenite; and unidentified thorium-bearing minerals at one locality in Sec. 23, one in Sec. 27, and one in Sec. 28, the last two being associated with radioactivity anomalies, all in the syenite complex: 1115; the allanite reported as float in Sec. 15 occurred as a single massive specimen weighing 2 lbs. and altered to a yellowish or brownish color on the exterior but fresh and black on the interior; the specimen contains 0.57% eU and 0.001% U and a spectrographic analysis gave 7-9% Th; X-ray powder photographs gave a very diffuse pattern indicating that the material is probably metamict; a second 10-lb. specimen, mostly pyroxene, quartz, and feldspar with a little allanite(?) gave 0.065% eU: 1115; rare-earth elements (lanthanides) are associated with all the radioactive mineral occurrences but the relative proportions vary: 1115; syenites of area contain allanite as a very minor accessory mineral: 743; geology: 1115; maps: 1115; structure: 1115.

WISCONSIN (contd.)

Marathon County (contd.)
Geophysical Exploration (Airborne)
Wausau: airborne and ground reconnaissance of part of the syenite complex of Precambrian age revealed 12 radioactive mineral localities: 1115; airborne reconnaissance of about 12 sq. mi. showed groups of anomalies at 7 localities, of which only 3 had been detected previously by ground traverses; anomalies outside the area underlain by nepheline syenite were related to concentrations of thorium-bearing minerals while those in area underlain by the syenite were due mainly to the mass effect of large areas of slightly radioactive syenite and nepheline syenite; channel sampling and shallow trenching were completed in areas of 2 anomalies, at localities previously found by ground traversing; channel samples from locality 1, which is outside the area underlain by syenite, totalled 5 ft. and contained about 1% Th, while those from locality 2 underlain by nepheline syenite, totalled 12 ft. and contained 0.21% Th; the depth and lateral extent of these occurrences are not known; thorogummite, thorium-bearing zircon, and unidentified thorium-bearing minerals reported here: 996; present studies of Secs. 9-28, T. 29 N., R. 6 E., by airborne scintillation survey meter and ground reconnaissance methods showed: allanite at one locality in Sec. 15 in the syenite complex; thorogummite at two localities in Sec. 27 and two in Sec. 28, the latter in areas of radioactivity anomalies, all outside the syenite complex; thorium-bearing zircon at one locality in Sec. 15, one in Sec. 22, and two in Sec. 23, all in

WISCONSIN (contd.)

Marathon County (contd.)
Geophysical Exploration (Airborne)
Wausau:
pegmatites in the syenite; and unidentified thorium-bearing minerals at one locality in Sec. 23, one in Sec. 27, and one in Sec. 28, the last two being associated with radioactivity anomalies, all in the syenite complex: 1115; high radioactivity, noted in the nepheline-syenite complex in an airborne radiometric survey of the region, was found, on closer investigation, to be due largely to thorium since thorogummite, thorium-bearing zircon, and other unidentified thorium-bearing minerals were present: 1092; except for one locality, there are no outcrops in the immediate vicinity of the radioactivity anomalies and the radioactivity seems to be due mainly to residual accumulations of radioactive minerals in soil or radioactive minerals occurring in float; shallow trenching at two of the largest anomalies showed that the radioactive material extended down into the weathered bedrock but the source of radioactive float at three localities was not determined: 1115.
Geophysical Exploration (Ground)
Wausau: airborne and ground reconnaissance of part of the syenite complex of Precambrian age revealed 12 radioactive mineral localities: 1115; airborne reconnaissance of about 12 sq. mi. showed groups of anomalies at 7 localities, of which only three had been detected previously by ground traversing; anomalies outside the area underlain by nepheline syenite were related to concentrations of thorium-bearing minerals while those in the area underlain by the syenite were due

WISCONSIN (contd.)

Marathon County (contd.)
Geophysical Exploration (Ground)
Wausau:
mainly to the mass effect of large areas of slightly radioactive syenite and nepheline syenite; channel sampling and shallow trenching were completed in areas of two anomalies at localities previously found by ground traversing; channel samples from locality 1, which is outside the area underlain by syenite, totalled 5 ft. and contained about 1% Th, while those from locality 2, underlain by nepheline syenite, totalled 12 ft. and contained 0.21% Th; the depth and lateral extent of these occurrences are not known; thorogummite, thorium-bearing zircon, and unidentified thorium-bearing minerals reported here: 996; present studies of Secs. 9-28, T. 29 N., R. 6 E., by airborne scintillation survey meter and ground reconnaissance methods showed: allanite at one locality in Sec. 15 in the syenite complex; thorogummite at two localities in Sec. 27 and two in Sec. 28, the latter in areas of radioactivity anomalies, all outside the syenite complex; thorium-bearing zircon at one locality in Sec. 15, one in Sec. 22, and two in Sec. 23, all in pegmatites in the syenite; and unidentified thorium-bearing minerals at one locality in Sec. 23, one in Sec. 27, and one in Sec. 28, the last two being associated with radioactivity anomalies, all in the syenite complex: 1115; earlier geologic investigations had reported the presence of marignacite, a form of pyrochlore, in the area as well as allanite or piedmontite at the rapids in the Wisconsin River at Wausau: 1115; results of

WISCONSIN (contd.)

Marathon County (contd.)
Geophysical Exploration (Ground)
Wausau:
analyses of samples collected in the area showed that Th is the principal radioactive element and is generally associated with small quantities of U but the ratio of the two elements is not constant; the highest U content occurred in zircon concentrates which had as much as 0.054% U and 0.8% Th, while the highest Th content was found in thorogummite, which had as much as an estimated 15 to 20% Th but only about 0.001% U; since most of the samples came from near the surface, differential leaching probably has decreased the original U/Th ratios because of the greater mobility of the uranium during weathering but, while a higher U content may be expected in unweathered samples taken at depth, the grade of material that may be present is still believed to be too low to be of commercial value: 1115; except for one locality, there are no outcrops in the immediate vicinity of the radioactivity anomalies and the radioactivity seems to be due mainly to residual accumulations of radioactive minerals in soil or radioactive minerals occurring in float; shallow trenching at two of the largest anomalies showed that the radioactive material extended down into the weathered bedrock but the source of radioactive float at three localities was not determined: 1115; geology: 1115; maps: 1115; structure: 1115.

WISCONSIN (contd.)

Marathon County (contd.)

Hematite, Thorium-bearing

Wausau, T. 29 N., R. 6 E.: a second anomaly about 100 ft. long and 70 ft. wide was found about 3/4 mi. to NE of the first one; there were no outcrops but radioactive float of amphibole(?) and perthite containing thorium-rich hematite, coating fractures, was found and the material is estimated to contain several percent Th besides zircon and possibly rare earths: 995.

Marignacite Occurrences

Wausau: airborne and ground reconnaissance of part of the syenite complex of Precambrian age revealed 12 radioactive mineral localities: 1115; earlier geologic investigations had reported the presence of marignacite, a form of pyrochlore, in the area as well as allanite or piedmontite at the rapids in the Wisconsin River at Wausau: 1115; marignacite, a variety of pyrochlore, in pegmatite: 1009, 1010; chemical analysis showed 0.20% ThO_2 and no uranium in marignacite: 1009, 1010.

Pyrochlore Occurrences

Wausau: airborne and ground reconnaissance of part of the syenite complex of Precambrian age revealed 12 radioactive mineral localities: 1115; earlier geologic investigations had reported the presence of marignacite, a form of pyrochlore, in the area as well as allanite or piedmontite at the rapids in the Wisconsin River at Wausau: 1115; marignacite, a variety of pyrochlore, in pegmatite: 1009, 1010; chemical analysis showed 0.20% ThO_2 and no uranium in marignacite: 1009, 1010.

WISCONSIN (contd.)

Marathon County (contd.)

Radioactive Rocks

Wausau

General: airborne reconnaissance of about 12 sq. mi. showed groups of anomalies at 7 localities, of which only three had been detected previously by ground traversing; anomalies outside the area underlain by nepheline syenite were related to concentrations of thorium-bearing minerals while those in area underlain by the syenite were due mainly to the mass effect of large areas of slightly radioactive syenite and nepheline syenite; channel sampling and shallow trenching were completed in areas of two anomalies, at localities previously found by ground traversing; channel samples from locality 1, which is outside the area underlain by syenite, totalled 5 ft. and contained about 1% Th, while those from locality 2, underlain by nepheline syenite, totalled 12 ft. and contained 0.21% Th; the depth and lateral extent of these occurrences are not known; thorogummite, thorium-bearing zircon, and unidentified thorium-bearing minerals reported here: 996; radioactivity studies of selected lamprophyres show that the radioactivity is concentrated at the lamprophyre-granite contacts and in deuteric veinlets-probably feeders; the highest concentration found was in syenite pegmatites and especially in lamprophyre-like lenses of arfvedsonite in and associated with pegmatites; a low background count was found in syenite wallrocks of the syenite pegmatites: 744.

WISCONSIN (contd.)

Marathon County (contd.)
Radioactive Rocks
Wausau
Lake Wausau quarry near Wausau: maximum radioactivity was found at the contact of the lamprophyre dike and the granite and at the border of the mafic-rich granite: 744.
Red Granite quarry at Red Granite: maximum radioactivity was at contact of lamprophyre dike and the granite and was low both within and outside the dike; the same pattern held for an associated one-inch dike: 744.
Two contiguous gray syenite quarries near Wausau: pegmatite material was studied and was characterized especially by anorthoclase and arfvedsonite; major maxima occurred in the arfvedsonite concentrations; and minor maxima in the pegmatites but latter are related to the amount of associated arfvedsonite: 744.
Wausau: 6 mi. NW of: study of nepheline syenite complex by carborne counter survey showed anomalies along a prominent W-trending and less prominent NW-trending alignment believed to be controlled by fracture system along which either radon or thoron seeps upward or there is a concentration of radioactive minerals; anomalies occur 1 mi. S of Th-bearing zircon-rich pegmatite area and may result from a similar body beneath or in greenstone, so that the complex is an area of potential thorium-rare earth deposits: 994.

WISCONSIN (contd.)

Marathon County (contd.)
Thorium Occurrences
Wausau: airborne and ground reconnaissance of part of the syenite complex of Precambrian age revealed 12 radioactive mineral localities: 1115; airborne reconnaissance of about 12 sq. mi. showed groups of anomalies at 7 localities, of which only 3 had been detected previously by ground traversing; anomalies outside the area underlain by nepheline syenite were related to concentrations of thorium-bearing minerals while those in area underlain by the syenite were due mainly to the mass effect of large areas of slightly radioactive syenite and nepheline syenite; channel sampling and shallow trenching were completed in areas of 2 anomalies, at localities previously found by ground traversing; channel samples from locality 1, which is outside the area underlain by syenite, totalled 5 ft. and contained 1% Th, while those from locality 2, underlain by nepheline syenite, totalled 12 ft. and contained 0.21% Th; the depth and lateral extent of these occurrences are not known; thorogummite, thorium-bearing zircon, and unidentified thorium-bearing minerals reported here: 996; earlier geologic investigations had reported the presence of marignacite, a form of pyrochlore, in the area as well as allanite or piedmontite at the rapids in the Wisconsin River at Wausau: 1115; present studies of Secs. 9-28, T. 29 N., R. 6 E., by airborne scintillation survey meter and ground reconnaissance methods showed: allanite at one locality in Sec. 15 in the syenite complex; thorogummite at two

WISCONSIN (contd.)

Marathon County (contd.)
Thorium Occurrences
Wausau:
localities in Sec. 27 and two in Sec. 28, the latter in areas of radioactivity anomalies, all outside the syenite complex; thorium-bearing zircon at one locality in Sec. 15, one in Sec. 22, and two in Sec. 23, all in pegmatites in the syenite; and unidentified thorium-bearing minerals at one locality in Sec. 23, one in Sec. 27, and one in Sec. 28, the last two being associated with radioactivity anomalies, all in the syenite complex: 1115; the allanite reported as float in Sec. 15 occurred as a single massive specimen weighing 2 lbs. and altered to a yellowish or brownish color on the exterior but fresh and black on the interior; the specimen contains 0.57% eU and 0.001% U and a spectrographic analysis gave 7-9% Th; X-ray powder photographs gave a very diffuse pattern indicating that the material is probably metamict; a second 10-lb. specimen, mostly pyroxene, quartz, and feldspar with a little allanite(?) gave 0.065% eU: 1115; the thorium-bearing zircon occurs in quartz-feldspar pegmatite float as reddish-brown to brown euhedral crystals ranging in length from 1 to 10 mm.; thin-sections of the rock showed the zircons to be well zoned, altered, iron-stained, and, in part, metamict; chemical analysis of altered zircon concentrates from Sec. 22 gave less than 0.05% U_2O_3 and less than 0.05% ThO_2, while a spectrographic analysis of impure zircon concentrates from Sec. 22 gave 0.7 to 0.9% Th: 1115; thorogummite: 883; thorogummite occurs as reddish nodules

WISCONSIN (contd.)

Marathon County (contd.)
Thorium Occurrences
Wausau:
from 0.5 to 1 inch in diameter in residual soil and weathered bedrock; X-ray powder photographs showed it to be crystalline and associated with various amounts of hematite; a semi-quantitative spectrographic analysis of an impure sample gave 4-6% Th and 0.4-0.6% Ce, Dy, Er, Gd, La, and and Sm and the sample contained 2.5% eU and 0.001% cU: 1115; except for one locality, there are no outcrops in the immediate vicinity of the radioactivity anomalies and the radioactivity seems to be due mainly to residual accumulations of radioactive minerals in soil or radioactive minerals occurring in float; shallow trenching at two of the largest anomalies showed that the radioactive material extended down into the weathered bedrock but the source of radioactive float at three localities was not determined: 1115; high radioactivity, noted in the nepheline-syenite complex in an airborne radiometric survey of the region was found, on closer investigation, to be due largely to thorium since thorogummite, thorium-bearing zircon, and other unidentified thorium-bearing minerals were present: 1092; marignacite, a variety of pyrochlore, in pegmatite: 1009, 1010; chemical analysis showed 0.20% ThO_2 and no uranium in the marignacite: 1009, 1010; rare-earth elements (lanthanides) are associated with all the radioactive mineral occurrences but the relative proportions vary: 1115; results of analyses of samples collected in the area showed that Th is the principal radioactive element and is generally associated

WISCONSIN (contd.)

Marathon County (contd.)
Thorium Occurrences
Wausau:
with small quantities of U but the ratio of the two elements is not constant; the highest U content occurred in zircon concentrates which had as much as 0.054% U and 0.8% Th, while the highest Th content was found in thorogummite, which had as much as an estimated 15 to 20% Th but only about 0.001% U; since most of the samples came from near the surface, differential leaching probably has decreased the original U/Th ratios because of the greater mobility of the uranium during weathering but, while a higher U content may be expected in unweathered samples taken at depth, the grade of material that may be present is still believed to be too low to be of commercial value: 1115; syenites of area contain allanite as a very minor accessory mineral: 743; geology: 1115; maps: 1115; structure: 1115;
Wausau, 6 mi. NW of: study of nepheline syenite complex by carborne counter survey showed anomalies along a prominent W-trending and less prominent NW-trending alignment believed to be controlled by fracture system along which either radon or thoron seeps upward or there is a concentration of radioactive minerals; anomalies occur 1 mi. S of Th-bearing zircon-rich pegmatite area and may result from a similar body beneath or in greenstone; so that the complex is an area of potential thorium-rare earth deposits: 994.

WISCONSIN (contd.)

Marathon County (contd.)
Thorium Occurrences
Wausau area, T. 29 N., R. 6 E.,:
thorogummite occurrence, found 2 ft. below soil, is believed to be caused by a near-surface concentration by weathering of a thorium-rich rare-earth pegmatite; discovery was in the center of a radioactivity anomaly, found in 1953, of which the known dimensions were increased to a length of 800 ft. and a width of 2-10 ft. through additional reconnaissance with a scintillation counter; there are no outcrops and the size and grade of the occurrence are unknown; a second anomaly about 100 ft. long and 70 ft. wide was found about 3/4 mi. to NE of the first one; there were no outcrops but radioactive float of amphibole(?) and perthite containing thorium-rich hematite, coating fractures, was found and the material is estimated to contain several percent Th besides zircon and possibly rare earths: 995.
Hematite, Thorium-bearing
Wausau, T. 29 N., R. 6 E.: a second anomaly about 100 ft. long and 70 ft. wide was found about 3/4 mi. to NE of the first one; there were no outcrops but radioactive float of amphibole(?) and perthite containing thorium-rich hematite, coating fractures, was found and the material is estimated to contain several percent Th besides zircon and possibly rare earths: 995.

WISCONSIN (contd.)

Marathon County (contd.)
Thorium Occurrences
Zircon, Thorium-bearing
Wausau: airborne and ground reconnaissance of part of the syenite complex of Precambrian age revealed 12 radioactive mineral localities: 1115; airborne reconnaissance of about 12 sq. mi. showed groups of anomalies at 7 localities, of which only 3 had been detected previously by ground traversing; anomalies outside the area underlain by nepheline syenite were related to concentrations of thorium-bearing minerals while those in area underlain by the syenite were due mainly to the mass effect of large areas of slightly radioactive syenite and nepheline syenite; channel sampling and shallow trenching were completed in areas of two anomalies, at localities previously found by ground traversing; channel samples from locality 1, which is outside the area underlain by syenite, totalled 5 ft. and contained about 1% Th, while those from locality 2, underlain by nepheline syenite, totalled 12 ft. and contained 0.21% Th; the depth and lateral extent of these occurrences are not known; thorogummite, thorium-bearing zircon, and unidentified thorium-bearing minerals reported here: 996; present studies of Secs. 9-28, T. 29 N., R. 6 E., by airborne scintillation survey meter and ground reconnaissance methods showed: allanite at one locality in Sec. 15 in the syenite complex; thorogummite at two localities in Sec. 27 and two in Sec. 28, the latter in areas of radioactivity anomalies, all outside the syenite

WISCONSIN (contd.)

Marathon County (contd.)
Thorium Occurrences
Zircon-Thorium-bearing
Wausau:
complex; thorium-bearing zircon at one locality in Sec. 15, one in Sec. 22, and two in Sec. 23, all in pegmatites in the syenite; and unidentified thorium-bearing minerals at one locality in Sec. 23, one in Sec. 27, and one in Sec. 28, the last two being associated with radioactivity anomalies; all in the syenite complex: 1115; the thorium-bearing zircon occurs in quartz-feldspar pegmatite float as reddish--brown to brown euhedral crystals ranging in length from 1 to 10 mm.; thin-sections of the rock showed the zircons to be well zoned, altered, iron-stained, and, in part, metamict; chemical analysis of altered zircon concentrates from Sec. 22 gave less than 0.05% U_2O_3 and less than 0.05% ThO_2, while a spectrographic analysis of impure zircon concentrates from Sec. 22 gave 0.7 to 0.9% Th: 1115; results of analyses of samples collected in the area showed that Th is the principal radioactive element and is generally associated with small quantities of U but the ratio of the two elements is not constant; the highest U content occurred in zircon concentrates which had as much as 0.054% U and 0.8% Th while the highest Th content was found in thorogummite, which had as much as an estimated 15 to 20% Th but only about 0.001% U; since most of the samples came from near the surface, differential leaching probably has decreased the original U/Th ratios because of the greater mobility of the uranium during

WISCONSIN (contd.)

Marathon County (contd.)
Thorium Occurrences
Zircon, Thorium-bearing
Wausau:
weathering, but while a higher U content may be expected in unweathered samples taken at depth, the grade of material that may be present is still believed to be too low to be of commercial value: 1115; high radioactivity, noted in the nepheline-syenite complex in an airborne radiometric survey of the region was found on closer investigation, to be due largely to thorium since thorogummite, thorium-bearing zircon, and other unidentified thorium-bearing minerals were present: 1092.

Thorogummite Occurrences
Wausau: airborne and ground reconnaissance of part of the syenite complex of Precambrian age revealed 12 radioactive mineral localities: 1115; airborne reconnaissance of about 12 sq. mi. showed groups of anomalies at 7 localities, of which only 3 had been detected previously by ground traversing; anomalies outside the area underlain by nepheline syenite were related to concentrations of thorium-bearing minerals while those in area underlain by the syenite were due mainly to the mass effect of large areas of slightly radioactive syenite and nepheline syenite; channel sampling and shallow trenching were completed in areas of two anomalies; at localities previously found by ground traversing; channel samples from locality 1, which is outside the area underlain by syenite, totalled 5 ft. and contained about 1% Th, while those from locality 2, underlain by nepheline syenite, totalled

WISCONSIN (contd.)

Marathon County (contd.)
Thorogummite Occurrences
Wausau:
12 ft. and contained 0.21% Th; the depth and lateral extent of these occurrences are not known; thorogummite, thorium-bearing zircon, and unidentified thorium-bearing minerals reported here: 996; present studies of Secs. 9-28, T. 29 N., R. 6 E., by airborne scintillation survey meter and ground reconnaissance methods showed: allanite at one locality in Sec. 15 in the syenite complex; thorogummite at two localities in Sec. 27 and two in Sec. 28, the latter in areas of radioactivity anomalies, all outside the syenite complex; thorium-bearing zircon at one locality in Sec. 15, one in Sec. 22, and two in Sec. 23, all in pegmatites in the syenite; and unidentified thorium-bearing minerals at one locality in Sec. 23, one in Sec. 27, and one in Sec. 28, the last two being associated with radioactivity anomalies all in the syenite complex: 1115; earlier geologic investigations had reported the presence of marignacite, a form of pyrochlore, in the area, as well as allanite or piedmontite at the rapids in the Wisconsin River at Wausau: 1115; high radioactivity, noted in the nepheline-syenite complex in an airborne radiometric survey of the region, was found, on close investigation, to be due largely to thorium since thorogummite, thorium-bearing zircon, and other unidentified thorium-bearing minerals were present: 1092; thorogummite: 883; thorogummite occurs as reddish nodules from 0.5 to 1 inch in diameter in residual soil and weathered bedrock; X-ray powder photographs showed it to be crystalline and associated with

WISCONSIN (contd.)

Marathon County (contd.)
Thorogummite Occurrences
Wausau:
various amounts of hematite; a semi-quantitative spectrographic analysis of an impure sample gave 4-6% Th and 0.4-0.6% Ce, Dy, Er, Gd, La, and Sm and the sample contained 2.5% eU and 0.001% cU: 1115; except for one locality, there are no outcrops in the immediate vicinity of the radioactivity anomalies and the radioactivity seems to be due mainly to residual accumulations of radioactive minerals in soil or radioactive minerals occurring in float; shallow trenching at two of the largest anomalies showed that the radioactive material extended down into unweathered bedrock but the source of radioactive float at three localities was not determined: 1115; rare earth elements (lanthanides) are associated with all the radioactive mineral occurrences but the relative proportions vary: 1115; results of analyses of samples collected in the area showed that Th is the principal radioactive element and is generally associated with small quantities of U but the ratio of the two elements is not constant; the highest U content occurred in zircon concentrates which had as much as 0.054% U and 0.8% Th, while the highest Th content was found in thorogummite, which had as much as an estimated 15 to 20% Th, but only about 0.001% U; since most of the samples came from near the surface, differential leaching probably has decreased the original U/Th ratios because of the greater mobility of the uranium during weathering but, while a higher

WISCONSIN (contd.)

Marathon County (contd.)
Thorogummite Occurrences
Wausau:
U content may be expected in unweathered samples taken at depth, the grade of material that may be present is still believed to be too low to be of commercial value: 1115; geology: 1115; maps: 1115; structure: 1115.
Wausau area, T. 29 N., R. 6 E.:
thorogummite occurrence, found 2 ft. below soil, is believed to be caused by a near-surface concentration by weathering of a thorium-rich rare-earth pegmatite; discovery was in the center of a radioactivity anomaly, found in 1953, of which the known dimensions were increased to a length of 800 ft. and a width of 2-10 ft. through additional reconnaissance with a scintillation counter; there are no outcrops and the size and grade of the occurrence are unknown; a second anomaly about 100 ft. long and 70 ft. wide was found about 3/4 mi. to NE of the first one; there were no outcrops but radioactive float of amphibole(?) and perthite containing thorium-rich hematite, coating fractures, was found and the material is estimated to contain several percent Th besides zircon and possibly rare earths: 995.
Uranium Exploration
Wausau: airborne and ground reconnaissance of part of the syenite complex of Precambrian age revealed 12 radioactive mineral localities: 1115; airborne reconnaissance of about 12 sq. mi. showed groups of anomalies at 7 localities, of which only three had been detected previously by ground traversing; anomalies outside the area underlain by nepheline syenite were related to concentrations of thorium-bearing minerals while those in the area underlain by the syenite were due mainly to

WISCONSIN (contd.)

Marathon County (contd.)
Uranium Exploration
Wausau:
the mass effect of large areas of slightly radioactive syenite and nepheline syenite; channel sampling and shallow trenching were completed in areas of two anomalies at localities previously found by ground traversing; channel samples from locality 1, which is outside the area underlain by syenite, totalled 5 ft. and contained about 1% Th, while those from locality 2, underlain by nepheline syenite, totalled 12 ft. and contained 0.21% Th; the depth and lateral extent of these occurrences are not known; thorogummite, thorium-bearing zircon, and unidentified thorium-bearing minerals reported here: 996; present studies of Secs. 9-28, T. 29 N., R. 6 E., by airborne scintillation survey meter and ground reconnaissance methods showed: allanite at one locality in Sec. 15 in the syenite complex; thorogummite at two localities in Sec. 27 and two in Sec. 28, the latter in areas of radioactivity anomalies, all outside the syenite complex; thorium-bearing zircon at one locality in Sec. 15, one in Sec. 22, and two in Sec. 23, all in pegmatites in the syenite; and unidentified thorium-bearing minerals at one locality in Sec. 23, one in Sec. 27, and one in Sec. 28, the last two being associated with radioactivity anomalies all in the syenite complex: 1115; earlier geologic investigations had reported the presence of marignacite, a form of pyrochlore, in the area as well as allanite or piedmontite at the rapids in the Wisconsin River at Wausau: 1115; except for one locality, there are no outcrops in the immediate vicinity of the

WISCONSIN (contd.)

Marathon County (contd.)
Uranium Exploration
Wausau:
radioactivity anomalies and the radioactivity seems to be due mainly to residual accumulations of radioactive minerals in soil or radioactive minerals occurring in float; shallow trenching at two of the largest anomalies showed that the radioactive material extended down into the weathered bedrock but the source of radioactive float at three localities was not determined: 1115; results of analyses of samples collected in the area showed that Th is the principal radioactive element and is generally associated with small quantities of U but the ratio of the two elements is not constant; the highest U content occurred in zircon concentrates which had as much as 0.054% U and 0.8% Th, while the highest Th content was found in thorogummite, which had as much as an estimated 15 to 20% Th but only about 0.001% U; since most of the samples came from near the surface, differential leaching probably has decreased the original U/Th ratios because of the greater mobility of the uranium during weathering but while a higher U content may be expected in unweathered samples taken at depth, the grade of material that may be present is still believed to be too low to be of commercial value: 1115; geology: 1115; maps: 1115; structure: 1115.

WISCONSIN (contd.)

Marathon County (contd.)
Uranium Exploration
Geophysical Exploration (Airborne)
Wausau: airborne and ground reconnaissance of part of the syenite complex of Precambrian age revealed 12 radioactive mineral localities: 1115; airborne reconnaissance of about 12 sq. mi. showed groups of anomalies at 7 localities, of which only three had been detected previously by ground traversing; anomalies outside the area underlain by nepheline syenite were related to concentrations of thorium-bearing minerals while those in area underlain by syenite were due mainly to the mass effect of large areas of slightly radioactive syenite and nepheline syenite; channel sampling and shallow trenching were completed in areas of two anomalies, at localities previously found by ground traversing; channel samples from locality 1, which is outside the area underlain by syenite, totalled 5 ft. and contained about 1% Th, while those from locality 2, underlain by nepheline syenite, totalled 12 ft. and contained 0.21% Th; the depth and lateral extent of these occurrences are not known; thorogummite, thorium-bearing zircon, and unidentified thorium-bearing minerals reported here: 996; present studies of Secs. 9-28, T. 29 N., R. 6 E., by airborne scintillation survey meter and ground reconnaissance methods showed: allanite at one locality in Sec. 15 in the syenite complex; thorogummite at two localities in Sec. 27 and two in Sec. 28, the latter in areas of radioactivity anomalies, all outside the syenite complex; thorium-bearing zircon at

WISCONSIN (contd.)

Marathon County (contd.)
Uranium Exploration
Geophysical Exploration (Airborne)
Wausau:
one locality in Sec. 15, one in Sec. 22, and two in Sec. 23, all in pegmatites in the syenite; and unidentified thorium-bearing minerals at one locality in Sec. 23, one in Sec. 27, and one in Sec. 28, the last two being associated with radioactivity anomalies, all in the syenite complex: 1115; high radioactivity noted in the nepheline-syenite complex in an airborne radiometric survey of the region, was found, on closer investigation, to be due largely to thorium since thorogummite, thorium-bearing zircon, and other unidentified thorium-bearing minerals were present: 1092; except for one locality, there are no outcrops in the immediate vicinity of the radioactivity anomalies and the radioactivity seems to be due mainly to residual accumulations of radioactive minerals in soil or radioactive minerals in float; shallow trenching at two of the largest anomalies showed that the radioactive material extended down into the weathered bedrock but the source of radioactive float at three localities was not determined: 1115.
Geophysical Exploration (Ground)
Wausau: airborne and ground reconnaissance of part of the syenite complex of Precambrian age revealed 12 radioactive mineral localities: 1115; airborne reconnaissance of about 12 sq. mi. showed groups of anomalies at 7 localities, of which only three had been detected previously by ground traversing; anomalies outside the area underlain by

WISCONSIN (contd.)

Marathon County (contd.)
Uranium Exploration
Geophysical Exploration (Ground)
Wausau:

nepheline syenite were related to concentrations of thorium-bearing minerals while those in the area underlain by the syenite were due mainly to the mass effect of large areas of slightly radioactive syenite and nepheline syenite; channel sampling and shallow trenching were completed in areas of two anomalies at localities previously found by ground traversing; channel samples from locality 1, which is outside the area underlain by syenite, totalled 5 ft. and contained about 1% Th, while those from locality 2, underlain by nepheline syenite, totalled 12 ft. and contained 0.21% Th; the depth and lateral extent of these occurrences are not known; thorogummite, thorium-bearing zircon, and unidentified thorium-bearing minerals reported here: 996; present studies of Secs. 9-28, T. 29 N., R. 6 E., by airborne scintillation survey meter and ground reconnaissance methods showed allanite at one locality in Sec. 15 in the syenite complex; thorogummite at two localities in Sec. 27 and two in Sec. 28, the latter in areas of radioactivity anomalies, all outside the syenite complex; thorium-bearing zircon at one locality in Sec. 15, one in Sec. 22, and two in Sec. 23, all in pegmatites in the syenite; and unidentified thorium-bearing minerals at one locality in Sec. 23, one in Sec. 27, and one in Sec. 28, the last two being associated with radio-

WISCONSIN (contd.)

Marathon County (contd.)
Uranium Exploration
Geophysical Exploration (Ground)
Wausau:

activity anomalies, all in the syenite complex: 1115; earlier geologic investigations had reported the presence of marignacite, a form of pyrochlore, in the area as well as allanite or piedmontite at the rapids in the Wisconsin River at Wausau: 1115; results of analyses of samples collected in the area showed that Th is the principal radioactive element and is generally associated with small quantities of U but the ratio of the two elements is not constant; the highest U content occurred in zircon concentrates which had as much as 0.054% U and 0.8% Th, while the highest Th content was found in thorogummite, which had as much as an estimated 15 to 20% Th but only about 0.001% U; since most of the samples came from near the surface, differential leaching probably has decreased the original U/Th ratios because of the greater mobility of the uranium during weathering but, while a higher U content may be expected in unweathered samples taken at depth, the grade of material that may be present is still believed to be too low to be of commercial value: 1115; except for one locality, there are no outcrops in the immediate vicinity of the radioactivity anomalies and the radioactivity seems to be due mainly to residual accumulations of radioactive minerals in soil or radioactive minerals occurring in float; shallow trenching at two of the largest anomalies showed that the radioactive material extended down into the weathered

WISCONSIN (contd.)

Marathon County (contd.)
Uranium Exploration
Geophysical Exploration (Ground)
Wausau:
bedrock but the source of radioactive float at three localities was not determined: 1115; geology: 1115; maps: 1115; structure: 1115.
Uranium Occurrences
Wausau: airborne and ground reconnaissance of part of the syenite complex of Precambrian age revealed 12 radioactive mineral localities: 1115; airborne reconnaissance of about 12 sq. mi. showed groups of anomalies at 7 localities, of which only three had been detected previously by ground traversing; anomalies outside the area underlain by nepheline syenite were related to concentrations of thorium-bearing minerals while those in area underlain by syenite were due mainly to the mass effect of large areas of slightly radioactive syenite and nepheline syenite; channel sampling and shallow trenching were completed in areas of two anomalies, at localities previously found by ground traversing; channel samples from locality 1, which is outside the area underlain by syenite, totalled 5 ft. and contained about 1% Th while those from locality 2, underlain by nepheline syenite, totalled 12 ft. and contained 0.21% Th; the depth and lateral extent of these occurrences are not known; thorogummite, thorium-bearing zircon, and unidentified thorium-bearing minerals reported here: 996; earlier geologic investigations had reported the presence of marignacite, a form of pyrochlore, in the area, as well as allanite or piedmontite at the rapids in the Wisconsin River at Wausau: 1115; present studies of Secs. 9-28, T. 29 N., R. 6 E., by airborne scintillation survey

WISCONSIN (contd.)

Marathon County (contd.)
Uranium Occurrences
Wausau:
meter and ground reconnaissance methods showed: allanite at one locality in Sec. 15 in the syenite complex; thorogummite at two localities in Sec. 27 and two in Sec. 28, the latter in areas of radioactivity anomalies, all outside the syenite complex; thorium-bearing zircon at one locality in Sec. 15, one in Sec. 22, and two in Sec. 23, all in pegmatites in the syenite; and unidentified thorium-bearing minerals at one locality in Sec. 23, one in Sec. 27, and one in Sec. 28, the last two being associated with radioactivity anomalies, all in the syenite complex; 1115; the allanite reported as float in Sec. 15 occurred as a single massive specimen weighing 2 lbs. and altered to a yellowish or brownish color on the exterior but fresh and black on the interior; the specimen contains 0.57% eU and 0.001% U and a spectrographic analysis gave 7-9% Th; X-ray powder photographs gave a very diffuse pattern indicating that the material is probably metamict; a second 10-lb. specimen, mostly pyroxene, quartz, and feldspar with a little allanite(?) gave 0.065% eU: 1115; thorogummite: 883; thorogummite occurs as reddish nodules from 0.5 to 1 inch in diameter in residual soil and weathered bedrock; X-ray powder photographs showed it to be crystalline and associated with various amounts of hematite; a semi-quantitative spectrographic analysis of an impure sample gave 4-6% Th and 0.4-0.6% Ce, Dy, Er, Gd, La, and Sm and the sample contained 2.5% eU and 0.001% cU: 1115; the thorium-bearing zircon occurs in quartz-feldspar pegmatite float as reddish-brown to brown euhedral crystals ranging in

WISCONSIN (contd.)

Marathon County (contd.)
Uranium Occurrences
Wausau:
length from 1 to 10 mm.; thin-sections of the rock showed the zircons to be well zoned, altered, iron-stained, and, in part, metamict; chemical analysis of altered zircon concentrates from Sec. 22 gave less than 0.05% U_2O_3 and less than 0.05% ThO_2, while a spectrographic analysis of impure zircon concentrates from Sec. 22 gave 0.7 to 0.9% Th: 1115; high radioactivity noted in the nepheline-syenite complex in an airborne radiometric survey of the region was found, on closer investigation, to be due largely to thorium since thorogummite, thorium-bearing zircon, and other unidentified thorium-bearing minerals were present: 1092; except for one locality there are no outcrops in the immediate vicinity of the radioactivity anomalies and the radioactivity seems to be due mainly to residual accumulations of radioactive minerals in soil or radioactive minerals occurring in float; shallow trenching at two of the largest anomalies showed that the radioactive material extended down into the weathered bedrock but the source of radioactive float at three localities was not determined: 1115; rare-earth elements (lanthanides) are associated with all the radioactive mineral occurrences but the relative proportions vary: 1115; results of analyses of samples collected in the area showed that Th is the principal radioactive element and is generally associated with small quantities of U but the ratio of the two elements is not constant; the highest U content

WISCONSIN (contd.)

Marathon County (contd.)
Uranium Occurrences
Wausau:
occurred in zircon concentrates which had as much as 0.054% U and 0.8% Th, while the highest Th content was found in thorogummite, which had as much as an estimated 15 to 20% Th but only about 0.001% U; since most of the samples came from near the surface, differential leaching probably has decreased the original U/Th ratios because of the greater mobility of the uranium during weathering but, while a higher U content may be expected in unweathered samples taken at depth, the grade of material that may be present is still believed to be too low to be of commercial value: 1115; geology: 1115; maps: 1115; structure: 1115.
Wausau area, T. 29 N., R. 6 E.:
thorogummite occurrence, found 2 ft. below soil, is believed to be caused by a near-surface concentration by weathering of a thorium-rich rare-earth pegmatite; discovery was in the center of a radioactivity anomaly, found in 1953, of which the known dimensions were increased to a length of 800 ft. and a width of 2-10 ft. through additional reconnaissance with a scintillation counter; there are no outcrops and the size and grade of the occurrence are unknown: 995.
Zircon, Uranium-bearing
Wausau: airborne and ground reconnaissance of part of the syenite complex of Precambrian age revealed 12 radioactive mineral localities: 1115; present studies of Sec. 9-28, T. 29 N., R. 6 E., by airborne scintillation survey meter and ground reconnaissance methods showed: allanite at one locality in Sec. 15, in the

WISCONSIN (contd.)

Marathon County (contd.)
Uranium Occurrences
Zircon, Uranium-bearing
Wausau:
syenite complex; thorogummite at two localities in Sec. 27 and two in Sec. 28, the latter in areas of radioactivity anomalies, all outside the syenite complex; thorium-bearing zircon at one locality in Sec. 15, one in Sec. 22, and two in Sec. 23, all in pegmatites in the syenite; and unidentified thorium-bearing minerals at one locality in Sec. 23, one in Sec. 27, and one in Sec. 28, the last two being associated with radioactivity anomalies, all in the syenite complex: 1115; the thorium-bearing zircon occurs in quartz-feldspar pegmatite float as reddish-brown to brown euhedral crystals ranging in length from 1 to 10 mm.; thin-sections of the rock showed the zircons to be well zoned, altered, iron-stained, and, in part, metamict; chemical analysis of altered zircon concentrates from Sec. 22 gave less than 0.05% U_2O_3 and less than 0.05% ThO_2, while a spectrographic analysis of impure zircon concentrates from Sec. 22 gave 0.7 to 0.9% Th: 1115; results of analyses of samples collected in the area showed that Th is the principal radioactive element and is generally associated with small quantities of U but the ratio of the two elements is not constant; the highest U content occurred in zircon concentrates which had as much as 0.054% U and 0.8% Th, while the highest Th content was found in thorogummite, which had as much as an estimated 15 to

WISCONSIN (contd.)

Marathon County (contd.)
Uranium Occurrences
Zircon, Uranium-bearing
Wausau:
20% Th but only about 0.001% U; since most of the samples came from near the surface, differential leaching probably has decreased the original U/Th ratios because of the greater mobility of the uranium during weathering but, while a higher U content may be expected in unweathered samples taken at depth, the grade of material that may be present is still believed to be too low to be of commercial value: 1115.
Zircon, Thorium-bearing
Wausau: airborne and ground reconnaissance of part of the syenite complex of Precambrian age revealed 12 radioactive mineral localities: 1115; airborne reconnaissance of about 12 sq. mi. showed groups of anomalies at 7 localities, of which only three had been detected previously by ground traversing; anomalies outside the area underlain by nepheline syenite were related to concentrations of thorium-bearing minerals while those in area underlain by the syenite were due mainly to the mass effect of large areas of slightly radioactive syenite and nepheline syenite; channel sampling and shallow trenching were completed in areas of two anomalies, at localities previously found by ground traversing; channel samples from locality 1, which is outside the area underlain by syenite, totalled 5 ft. and contained about 1% Th, while those from locality 2, underlain by nepheline syenite, totalled 12 ft. and contained 0.21% Th; the depth and lateral extent of these occurrences are not known; thorogummite, thorium-bearing zircon, and

WISCONSIN (contd.)

Marathon County (contd.)
Zircon, Thorium-bearing
Wausau:
unidentified thorium-bearing minerals reported here: 996; present studies of Secs. 9-28, T. 29 N., R. 6 E., by airborne scintillation survey meter and ground reconnaissance methods showed: allanite at one locality in Sec. 15 in the syenite complex; thorogummite at two localities in Sec. 27 and two in Sec. 28, the latter in areas of radioactivity anomalies, all outside the syenite complex; thorium-bearing zircon at one locality in Sec. 15, one in Sec. 22, and two in Sec. 23, all in pegmatites in the syenite; and unidentified thorium-bearing minerals at one locality in Sec. 23, one in Sec. 27, and one in Sec. 28, the last two being associated with radioactivity anomalies, all in the syenite complex: 1115; the thorium-bearing zircon occurs in quartz-feldspar pegmatite float as reddish-brown to brown euhedral crystals ranging in length from 1 to 10 mm.; thin-sections of the rock showed the zircons to be well zoned, altered, iron-stained, and, in part, metamict; chemical analysis of altered zircon concentrates from Sec. 22 gave less than 0.05% U_2O_3 and less than 0.05% ThO_2, while a spectrographic analysis of impure zircon concentrates from Sec. 22 gave 0.7 to 0.9% Th: 1115; results of analyses of samples collected in the area showed that Th is the principal radioactive element and is generally associated with small quantities of U but the ratio of the two elements is not constant; the highest U content occurred in

WISCONSIN (contd.)

Marathon County (contd.)
Zircon, Thorium-bearing
Wausau:
zircon concentrates which had as much as 0.054% U and 0.8% Th, while the highest Th content was found in thorogummite, which had as much as an estimated 15 to 20% Th but only about 0.001% U; since most of the samples came from near the surface, differential leaching probably has decreased the original U/Th ratios because of the greater mobility of the uranium during weathering but, while a higher U content may be expected in unweathered samples taken at depth, the grade of material that may be present is still believed to be too low to be of commercial value: 1115; high radioactivity, noted in the nepheline-syenite complex in an airborne radiometric survey of the region, was found, on closer investigation, to be due largely to thorium since thorogummite, thorium-bearing zircon, and other unidentified thorium-bearing minerals were present: 1092.
Zircon, Uranium-bearing
Wausau: airborne and ground reconnaissance of part of the syenite complex of Precambrian age revealed 12 radioactive mineral localities: 1115; present studies of Secs. 9-28, T. 29 N., R. 6 E., by airborne scintillation survey meter and ground reconnaissance methods showed: allanite at one locality in Sec. 15 in the syenite complex; thorogummite at two localities in Sec. 27 and two in Sec. 28, the latter in areas of radioactivity anomalies, all outside the syenite complex; thorium-bearing zircon at one locality in Sec. 15, one in Sec. 22, and two in Sec. 23, all in pegmatites in the syenite; and unidentified

WISCONSIN (contd.)

Marathon County (contd.)
Zircon, Uranium-bearing
Wausau:
thorium-bearing minerals at one locality in Sec. 23, one in Sec. 27, and one in Sec. 28, the last two being associated with radioactivity anomalies, all in the syenite complex: 1115; the thorium-bearing zircon occurs in quartz-feldspar pegmatite float as reddish-brown to brown euhedral crystals ranging in length from 1 to 10 mm.; thin-sections of the rock showed the zircons to be well zoned, altered, iron-stained, and, in part, metamict; chemical analysis of altered zircon concentrates from Sec. 22 gave less than 0.05% U_2O_3 and less than 0.05% ThO_2, while a spectrographic analysis of impure zircon concentrates from Sec. 22 gave 0.7 to 0.9% Th: 1115; results of analyses of samples collected in the area showed that Th is the principal radioactive element and is generally associated with small quantities of U but the ratio of the two elements is not constant; the highest U content occurred in zircon concentrates which had as much as 0.054% U and 0.8% Th, while the highest Th content was found in thorogummite which had as much as an estimated 15 to 20% Th but only about 0.001% U; since most of the samples came from near the surface, differential leaching probably has decreased the original U/Th ratios because of the greater mobility of the uranium during weathering but, while a higher U content may be expected in unweathered samples taken at depth, the grade of material that may be present is still believed to be too low to be of commercial value: 1115.

Marignacite Occurrences
Wisconsin-Marignacite Occurrences: See under individual county names and under Index III, Marignacite Occurrences-Wisconsin: 1009, 1010, 1115.

Marinette County
Radioactive Waters
Coleman
Village well: deep well: aquifer, Cambrian sandstone; Sample No. 10-32-1, residue showed 2.5 U ppm. and 67 alpha c.p.h. for 6 mos., and water showed 0.7 U ppb, 35 eU ppb, and 2.0% U/eU: 796.
Marinette
Marinette Paper Mills well: deep well: aquifer, Cambrian sandstone; Sample No. 10-26-1, residue showed 1.7 U ppm. and 93 alpha c.p.h. for 6 mos., and water showed 1.2 U ppb, 132 eU ppb, and 1% U/eU: 796.
Middle Inlet
Granite Quarry seep: surface water: passes through calcareous drift of Wisconsin age before seeping through granite; Sample No. 10-28-1, residue showed 4.3 U ppm. and 8 alpha c.p.h. for 6 mos., and water showed 0.85 U ppb, 3 eU ppb, and 28% U/eU: 796.
Peshtigo
Peshtigo Paper Mills well: deep well: aquifer, Cambrian sandstone; Sample No. 10-27-1, residue showed 0.9 U ppm. and 119 alpha c.p.h. for 6 mos., and water showed 0.2 U ppb, 42 eU ppb, and 0.5% U/eU: 796.

WISCONSIN (contd.)

Marinette County (contd.)
Radioactive Waters
Pound
Leo Cudnoski well: well of intermediate depth; aquifer, glacial drift; Sample No. 10-42-1, residue showed 6.5 U ppm. and 24 alpha c.p.h. for 6 mos., and water showed 1.4 U ppb, 10 eU ppb, and 14% U/eU: 796.
Uranium Occurrences
Waters, Uranium-bearing
Coleman
Village well: deep well: aquifer, Cambrian sandstone; Sample No. 10-32-1, residue showed 2.5 U ppm. and 67 alpha c.p.h. for 6 mos., and water showed 0.7 U ppb, 35 eU ppb, and 2.0% U/eU: 796.
Marinette
Marinette Paper Mills well: deep well: aquifer, Cambrian sandstone; Sample No. 10-26-1, residue showed 1.7 U ppm. and 93 alpha c.p.h. for 6 mos., and water showed 1.2 U ppb, 132 eU ppb, and 1% U/eU: 796.
Middle Inlet
Granite Quarry seep: surface water: passes through calcareous drift of Wisconsin age before seeping through granite; Sample No. 10-28-1, residue showed 4.3 U ppm. and 8 alpha c.p.h. for 6 mos., and water showed 0.85 U ppb, 3 eU ppb, and 28% U/eU: 796.
Peshtigo
Peshtigo Paper Mills well: deep well: aquifer, Cambrian sandstone; Sample No. 10-27-1, residue showed 0.9 U ppm. and 119 alpha c.p.h. for 6 mos., and water showed 0.2 U ppb, 42 eU ppb, and 0.5% U/eU: 796.

WISCONSIN (contd.)

Marinette County (contd.)
Uranium Occurrences
Waters, Uranium-bearing
Pound
Leo Cudnoski well: well of intermediate depth; aquifer, glacial drift; Sample No. 10-42-1, residue showed 6.5 U ppm. and 24 alpha c.p.h. for 6 mos., and water showed 1.4 U ppb, 10 eU ppb, and 14% U/eU: 796.
Waters, Uranium-bearing
Coleman
Village well: deep well: aquifer, Cambrian sandstone; Sample No. 10-32-1, residue showed 2.5 U ppm. and 67 alpha c.p.h. for 6 mos., and water showed 0.7 U ppb, 35 eU ppb, and 2.0% U/eU: 796.
Marinette
Marinette Paper Mills well: deep well: aquifer, Cambrian sandstone; Sample No. 10-26-1, residue showed 1.7 U ppm. and 93 alpha c.p.h. for 6 mos., and water showed 1.2 U ppb, 132 eU ppb, and 1% U/eU: 796.
Middle Inlet
Granite Quarry seep: surface water: passes through calcareous drift of Wisconsin age before seeping through granite; Sample No. 10-28-1, residue showed 4.3 U ppm. and 8 alpha c.p.h. for 6 mos., and water showed 0.85 U ppb, 3 eU ppb, and 28% U/eU: 796.
Peshtigo
Peshtigo Paper Mills well: deep well: aquifer, Cambrian sandstone; Sample No. 10-27-1, residue showed 0.9 U ppm. and 119 alpha c.p.h. for 6 mos., and water showed 0.2 U ppb, 42 eU ppb, and 0.5% U/eU: 796.

WISCONSIN (contd.)

Marinette County (contd.)
Waters, Uranium-bearing
Pound
Leo Cudnoski well: well of intermediate depth: aquifer, glacial drift; Sample No. 10-42-1, residue showed 6.5 U ppm. and 24 alpha c.p.h. for 6 mos., and water showed 1.4 U ppb, 10 eU ppb, and 14% U/eU: 796.

Monroe County
Radioactive Rocks
Tomah: this area of above average radioactivity was visited in 1955; a background count of 3 to 5 times normal was obtained at road cuts and shale pits in the Franconia formation, which is a flat-lying sandstone of Cambrian age and often called a "dirty" sandstone because it it characterized by beds of silt, shale, and glauconite: 1092; no local concentration of radioactivity was found in beds or veins to suggest the presence of ore-grade material, so probably the radioactive elements are highly disseminated and the high background is a mass effect: 1092; the general radioactivity of the rocks is so low that samples removed from outcrops show little if any radioactivity: 1092; one sample of uranium-bearing rock of ore grade was reported but a search of the pit from which it was collected failed to show any more similar material: 1092; further studies will be undertaken by the U.S.A.E.C. to determine if the radioactive element is uranium and, if so, what factors influenced its deposition, since present evidence does not indicate that the occurrence is of any commercial value: 1092.

WISCONSIN (contd.)

Monroe County (contd.)
Uranium Occurrences
Tomah: this area of above average radioactivity was visited in 1955; a background count of 3 to 5 times normal was obtained at road cuts and shale pits in the Franconia formation, which is a flat-lying sandstone of Cambrian age often called a "dirty" sandstone because it is characterized by beds of silt, shale, and glauconite: 1092; no local concentration of radioactivity was found in beds or veins to suggest the presence of ore-grade material, so probably the radioactive elements are highly disseminated and the high background is a mass effect: 1092; the general radioactivity of the rocks is so low that samples removed from outcrops show little if any radioactivity: 1092; one sample of uranium-bearing rock of ore grade was reported but a search of the pit from which it was collected failed to show any more similar material: 1092; further studies will be undertaken by the U.S.A.E.C. to determine if the radioactive element is uranium and, if so, what factors influenced its deposition, since present evidence does not indicate that the occurrence is of any commercial value: 1092.

Oconto County
Radioactive Waters
Lena
Village well: deep well: aquifer, Cambrian sandstone; Sample No. 10-29-1, residue showed 1.7 U ppm. and 102 alpha c.p.h. for 6 mos., and water showed 0.3 U ppb, 38 eU ppb, and 1% U/eU: 796.

WISCONSIN (contd.)

Oconto County (contd.)
Radioactive Waters
Mountain
Oconto River: surface water: Sample No. 10-33-1, residue showed 3.8 U ppm. and 6 alpha c.p.h. for 6 mos., and water showed 1.3 U ppb, 4 eU ppb, and 33% U/eU: 796.
Oconto
City Well No. 6: deep well: aquifer, Cambrian sandstone; Sample No. 10-31-1, residue showed 1.2 U ppm. and 109 alpha c.p.h. for 6 mos., and water showed 0.3 U ppb, 48 eU ppb, and 0.5% U/eU: 796.
Oconto Falls
City Well No. 3: deep well: aquifer, Cambrian sandstone; Sample No. 10-30-1, residue showed 1.8 U ppm. and 91 alpha c.p.h. for 6 mos., and water showed 0.3 U ppb, 34 eU ppb, and 1% U/eU: 796.
Walter Birr well: well of intermediate depth: aquifer, glacial drift; Sample No. 10-43-1, residue showed 0.6 U ppm. and 8 alpha c.p.h. for 6 mos., and water showed 0.2 U ppb, 4.5 eU ppb, and 4% U/eU: 796.
Uranium Occurrences
Waters, Uranium-bearing
Lena
Village well: deep well: aquifer, Cambrian sandstone; Sample No. 10-29-1, residue showed 1.7 U ppm. and 102 alpha c.p.h. for 6 mos., and water showed 0.3 U ppb, 38 eU ppb, and 1% U/eU: 796.
Mountain
Oconto River: surface water: Sample No. 10-33-1, residue showed 3.8 U ppm. and 6 alpha c.p.h. for 6 mos., and water showed 1.3 U ppb, 4 eU ppb, and 33% U/eU: 796.

WISCONSIN (contd.)

Oconto County (contd.)
Uranium Occurrences
Waters, Uranium-bearing
Oconto
City Well No. 6: deep well: aquifer, Cambrian sandstone; Sample No. 10-31-1, residue showed 1.2 U ppm. and 109 alpha c.p.h. for 6 mos., and water showed 0.3 U ppb, 48 eU ppb, and 0.5% U/eU: 796.
Oconto Falls
City Well No. 3: deep well: aquifer, Cambrian sandstone; Sample No. 10-30-1, residue showed 1.8 U ppm. and 91 alpha c.p.h. for 6 mos., and water showed 0.3 U ppb, 34 eU ppb, and 1% U/eU: 796.
Walter Birr well: well of intermediate depth: aquifer, glacial drift; Sample No. 10-43-1, residue showed 0.6 U ppm. and 8 alpha c.p.h. for 6 mos., and water showed 0.2 U ppb, 4.5 eU ppb, and 4% U/eU: 796.
Waters, Uranium-bearing
Lena
Village well: deep well: aquifer, Cambrian sandstone; Sample No. 10-29-1, residue showed 1.7 U ppm. and 102 alpha c.p.h. for 6 mos., and water showed 0.3 U ppb, 38 eU ppb, and 1% U/eU: 796.
Mountain
Oconto River: surface water: Sample No. 10-33-1, residue showed 3.8 U ppm. and 6 alpha c.p.h. for 6 mos., and water showed 1.3 U ppb, 4 eU ppb, and 33% U/eU: 796.
Oconto
City Well No. 6: deep well: aquifer, Cambrian sandstone; Sample No. 10-31-1, residue showed 1.2 U ppm. and 109 alpha c.p.h. for 6 mos., and water showed 0.3 U ppb, 48 eU ppb, and 0.5% U/eU: 796.

WISCONSIN (contd.)

Oconto County (contd.)
Waters, Uranium-bearing
Oconto Falls
City Well No. 3: deep well: aquifer, Cambrian sandstone; Sample No. 10-30-1, residue showed 1.8 U ppm. and 91 alpha c.p.h. for 6 mos., and water showed 0.3 U ppb, 34 eU ppb, and 1% U/eU: 796.
Walter Birr well: well of intermediate depth: aquifer, glacial drift; Sample No. 10-43-1, residue showed 0.6 U ppm. and 8 alpha c.p.h. for 6 mos., and water showed 0.2 U ppb, 4.5 eU ppb, and 4% U/eU: 796.

Outagamie County
Radioactive Waters
Appleton
Fox River: surface water; Sample No. 10-48-1, residue showed 3.7 U ppm. and 4 alpha c.p.h. for 6 mos., and water showed 0.5 U ppb, 1 eU ppb, and 50% U/eU: 796.
Outagamie Asylum: deep well: aquifer, Cambrian sandstone; Sample No. 10-1-1, residue showed 1.6 U ppm. and 39 alpha c.p.h. for 6 mos., and water showed 0.4 U ppb, 20 eU ppb, and 2% U/eU: 796.
Hortonville
City Well: deep well: aquifer, Cambrian sandstone; Sample No. 10-25-1, residue showed 3.7 U ppm. and 36 alpha c.p.h. for 6 mos., and water showed 1.2 U ppb, 23 eU ppb, and 5% U/eU: 796.

WISCONSIN (contd.)

Outagamie County (contd.)
Radioactive Waters
Kaukauna
City Well No. 4: deep well: aquifer, Cambrian sandstone; Sample No. 10-2-1, residue showed 1.6 U ppm. and 54 alpha c.p.h. for 6 mos., and water showed 1.7 U ppb, 112 eU ppb, and 1.5% U/eU: 796.
Rapid Crocke Powerhouse: well of intermediate depth: aquifer, Ordovician sandstone; residue showed 0.8 U ppm. and 54 alpha c.p.h. for 6 mos., and water showed 0.7 U ppb, 90 eU ppb, and 1% U/eU: 796.
Seymour
City Well No. 2: deep well: aquifer, Cambrian sandstone; Sample No. 10-14-1, residue showed 1.6 U ppm. and 46 alpha c.p.h. for 6 mos., and water showed 0.5 U ppb, 33 eU ppb, and 1.5% U/eU: 796.
George Sieserman well: well of intermediate depth: aquifer, Ordovician limestone; Sample No. 10-47-1, residue showed 0.6 U ppm. and 4 alpha c.p.h. for 6 mos., and water showed 0.2 U ppb, 2.5 eU ppb, and 8% U/eU: 796.
Uranium Occurrences
Waters, Uranium-bearing
Appleton
Fox River: surface water: Sample No. 10-48-1, residue showed 3.7 U ppm. and 4 alpha c.p.h. for 6 mos., and water showed 0.5 U ppb, 1 eU ppb, and 50% U/eU: 796.
Outagamie Asylum: deep well: aquifer, Cambrian sandstone: Sample No. 10-1-1, residue showed 1.6 U ppm. and 39 alpha c.p.h. for 6 mos., and water showed 0.4 U ppb, 20 eU ppb, and 2% U/eU: 796.

WISCONSIN (contd.)

Outagamie County (contd.)
Uranium Occurrences
Waters, Uranium-bearing
Hortonville
City Well: deep well: aquifer, Cambrian sandstone; Sample No. 10-25-1, residue showed 3.7 U ppm. and 36 alpha c.p.h. for 6 mos., and water showed 1.2 U ppb, 23 eU ppb, and 5% U/eU: 796.
Kaukauna
City Well No. 4: deep well: aquifer, Cambrian sandstone; Sample No. 10-2-1, residue showed 1.6 U ppm. and 54 alpha c.p.h. for 6 mos., and water showed 1.7 U ppb, 112 eU ppb, and 1.5% U/eU: 796.
Rapid Crocke Powerhouse: well of intermediate depth; aquifer, Ordovician sandstone; residue showed 0.8 U ppm. and 54 alpha c.p.h. for 6 mos., and water showed 0.7 U ppb, 90 eU ppb, and 1% U/eU: 796.
Seymour
City Well No. 2: deep well: aquifer, Cambrian sandstone; Sample No. 10-14-1, residue showed 1.6 U ppm. and 46 alpha c.p.h. for 6 mos., and water showed 0.5 U ppb, 33 eU ppb, and 1.5% U/eU: 796.
George Sieserman well: well of intermediate depth: aquifer, Ordovician limestone; Sample No. 10-47-1, residue showed 0.6 U ppm. and 4 alpha c.p.h. for 6 mos., and water showed 0.2 U ppb, 2.5 eU ppb, and 8% U/eU: 796.

WISCONSIN (contd.)

Outagamie County (contd.)
Waters, Uranium-bearing
Appleton
Fox River: surface water: Sample No. 10-48-1, residue showed 3.7 U ppm. and 4 alpha c.p.h. for 6 mos., and water showed 0.5 U ppb, 1 eU ppb, and 50% U/eU: 796.
Outagamie Asylum: deep well: aquifer, Cambrian sandstone; Sample No. 10-1-1, residue showed 1.6 U ppm. and 39 alpha c.p.h. for 6 mos., and water showed 0.4 U ppb, 20 eU ppb, and 2% U/eU: 796.
Hortonville
City Well: deep well: aquifer, Cambrian sandstone; Sample No. 10-25-1, residue showed 3.7 U ppm. and 36 alpha c.p.h. for 6 mos., and water showed 1.2 U ppb, 23 eU ppb, and 5% U/eU: 796.
Kaukauna
City Well No. 4: deep well: aquifer, Cambrian sandstone; Sample No. 10-2-1, residue showed 1.6 U ppm, and 54 alpha c.p.h. for 6 mos., and water showed 1.7 U ppb, 112 eU ppb, and 1.5% U/eU: 796.
Rapid Crocke Powerhouse: well of intermediate depth: aquifer, Ordovician sandstone; residue showed 0.8 U ppm. and 54 alpha c.p.h. for 6 mos., and water showed 0.7 U ppb, 90 eU ppb, and 1% U/eU: 796.
Seymour
City Well No. 2: deep well: aquifer, Cambrian sandstone: Sample No. 10-14-1, residue showed 1.6 U ppm and 46 alpha c.p.h. for 6 mos., and water showed 0.5 U ppb, 33 eU ppb, and 1.5% U/eU: 796.
George Sieserman well: well of intermediate depth: aquifer, Ordovician limestone; Sample No. 10-47-1, residue showed 0.6 U ppm. and 4 alpha c.p.h. for 6 mos., and water showed 0.2 U ppb, 2.5 eU ppb, and 8% U/eU: 796.

WISCONSIN (contd.)

Prospectors' Guides
Wisconsin-Prospectors' Guides:
See under individual county names and under Index III, Prospectors' Guides-Wisconsin: 1092.

Pyrochlore Occurrences
Wisconsin-Pyrochlore Occurrences:
See under individual county names and under Index III, Pyrochlore Occurrences-Wisconsin: 883, 1009, 1010, 1115.

Radioactive Plants
Wisconsin-Radioactive Plants:
See under individual county names and under Index III, Radioactive Plants-Wisconsin: 885.

Radioactive Rocks
Wisconsin-Radioactive Rocks:
See under individual county names and under Index III, Radioactive Rocks-Wisconsin: 744, 994, 996, 1092.

Radioactive Waters
Wisconsin-Radioactive Waters:
See under individual county names and under Index III, Radioactive Waters-Wisconsin: 796, 885.

Shawano County
Radioactive Waters
Bonduel
City Well: deep well: aquifer, Cambrian sandstone; Sample No. 10-13-1, residue showed 1.1 U ppm. and 75 alpha c.p.h. for 6 mos., and water showed 0.3 U ppb, 36 eU ppb, and 1% U/eU: 796.
Shawano
Wolf River: surface water: Sample No. 10-44-1, residue showed 1.2 U ppm. and 2 alpha c.p.h. for 6 mos., and water showed 0.4 U ppb, 1.5 eU ppb, and 27% U/eU: 796.

WISCONSIN (contd.)

Shawano County (contd.)
Uranium Occurrences
Waters, Uranium-bearing
Bonduel
City Well: deep well: aquifer, Cambrian sandstone; Sample No. 10-13-1, residue showed 1.1 U ppm. and 75 alpha c.p.h. for 6 mos., and water showed 0.3 U ppb, 36 eU ppb, and 1% U/eU: 796.
Shawano
Wolf River: surface water: Sample No. 10-44-1, residue showed 1.2 U ppm. and 2 alpha c.p.h. for 6 mos., and water showed 0.4 U ppb, 1.5 eU ppb, and 27% U/eU: 796.
Waters, Uranium-bearing
Bonduel
City Well: deep well: aquifer, Cambrian sandstone; Sample No. 10-13-1, residue showed 1.1 U ppm. and 75 alpha c.p.h. for 6 mos., and water showed 0.3 U ppb, 36 eU ppb, and 1% U/eU: 796.
Shawano
Wolf River: surface water: Sample No. 10-44-1, residue showed 1.2 U ppm. and 2 alpha c.p.h. for 6 mos., and water showed 0.4 U ppb, 1.5 eU ppb, and 27% U/eU: 796.

Thorium Occurrences
Wisconsin-Thorium Occurrences: See
See under individual county names and under Index III, Thorium Occurrences-Wisconsin: 743, 800, 883, 994, 995, 996, 1009, 1010, 1092, 1115.

Thorogummite Occurrences
Wisconsin-Thorogummite Occurrences:
See under individual county names and under Index III, Thorogummite Occurrences-Wisconsin: 883, 995, 996, 1092, 1115.

WISCONSIN (contd.)

Uranium Determinations
Wisconsin-Uranium Determinations:
See under individual county names and under Index III, Uranium Determinations-Wisconsin: 630.

Uranium Exploration
Wisconsin-Uranium Exploration:
See under individual county names and under Index III, Uranium Exploration-Wisconsin: 630, 996, 1074, 1092, 1115.

Uranium Occurrences
Wisconsin-Uranium Occurrences:
See under individual county names and under Index III, Uranium Occurrences-Wisconsin: 630, 796, 800, 883, 995, 996, 1092, 1115.

Waters, Uranium-bearing
Wisconsin-Waters, Uranium-bearing:
See under individual county names and under Index III, Waters-Uranium-bearing-Wisconsin: 630, 796.

Waupaca County
Radioactive Waters
Clintonville
Pigeon River: surface water: Sample No. 10-34-1, residue showed 16.0 U ppm and 16 alpha c.p.h. for 6 mos., and water showed 3.0 U ppb, 6 eU ppb, and 50% U/eU: 796.
Embarrass
Anthony Anton well: well of intermediate depth: aquifer, glacial drift; Sample No. 10-45-1, residue showed 0.4 U ppm and 11 alpha c.p.h. for 6 mos., and water showed 0.05 U ppb, 2.0 eU ppb, and 2.5% U/eU: 796.
Wedig Krubsach well: well of intermediate depth: aquifer, fractured granite and glacial drift; Sample No. 10-46-1, residue showed 10.0 U ppm and 29 alpha c.p.h. for 6 mos., and water showed 1.9 U ppb, 11 eU ppb, and 17% U/eU: 796.

WISCONSIN (contd.)

Waupaca County (contd.)
Uranium Occurrences
Waters, Uranium-bearing
Clintonville
Pigeon River: surface water: Sample No. 10-34-1, residue showed 16.0 U ppm and 16 alpha c.p.h. for 6 mos., and water showed 3.0 U ppb, 6 eU ppb, and 50% U/eU: 796.
Embarrass
Anthony Anton well: well of intermediate depth: aquifer, glacial drift; Sample No. 10-45-1, residue showed 0.4 U ppm and 11 alpha c.p.h. for 6 mos., and water showed 0.05 U ppb, 2.0 eU ppb, and 2.5% U/eU: 796.
Wedig Krubsach well: well of intermediate depth: aquifer, fractured granite and glacial drift; Sample No. 10-46-1, residue showed 10.0 U ppm and 29 alpha c.p.h. for 6 mos., and water showed 1.9 U ppb, 11 eU ppb, and 17% U/eU: 796.
Waters, Uranium bearing
Clintonville
Pigeon River: surface water: Sample No. 10-34-1, residue showed 16.0 U ppm and 16 alpha c.p.h. for 6 mos., and water showed 3.0 U ppb, 6 eU ppb, and 50% U/eU: 796.
Embarrass
Anthony Anton well: well of intermediate depth: aquifer, glacial drift; Sample No. 10-45-1, residue showed 0.4 U ppm and 11 alpha c.p.h. for 6 mos., and water showed 0.05 U ppb, 2.0 eU ppb, and 2.5% U/eU: 796.
Wedig Krubsach well: well of intermediate depth: aquifer, fractured granite and glacial drift; Sample No. 10-46-1, residue showed 10.0 U ppm and 29 alpha c.p.h. for 6 mos., and water showed 1.9 U ppb, 11 eU ppb, and 17% U/eU: 796.

WISCONSIN (contd.)

Zircon, Thorium-bearing
Wisconsin-Zircon, Thorium-bearing:
See under individual county names and under Index III, Zircon, Thorium-bearing-Wisconsin: 996, 1092, 1115.

Zircon, Uranium-bearing
Wisconsin- Zircon, Uranium-bearing:
See under individual county names and under Index III, Zircon, Uranium-bearing-Wisconsin: 1115.